2002/2003 Program
Fish & Wildlife
Project Handbook

A Guide For Projects And
Partners In The Columbia Basin

Columbia Basin

FISH & WILDLIFE
Compensation
Program

CBFWCP is a joint initiative between BC Hydro and the Government of British Columbia (Ministry of Water, Land & Air Protection) to conserve and enhance fish and wildlife populations affected by BC Hydro dams. BC Hydro funds the Program $3.2 million annually and MWLAP provides valuable technical expertise.

Colin Hansen, MLA BC Liberal Party
Room 337, Parliament Buildings
Victoria, BC V8V 1X4

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Columbia Basin Fish & Wildlife COMPENSATION PROGRAM

Columbia Basin Fish & Wildlife Compensation Program
103 – 333 Victoria Street
Nelson, BC V1L 4K3

Editor, Barry Bartlett

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Dear Partner & Stakeholder:

The Compensation Program is delivering 47 projects with over 200 partners in this project year to conserve and enhance fish and wildlife populations affected by **BC Hydro** dam construction in the Columbia Basin. The number and breadth of partners have grown quite dramatically from the 30 partners on 70 projects in 1996/97, CBFWCP's first full year of operations.

A very heartening trend is the growing range of partners. In 1996/97, the partners on CBFWCP projects were predominantly provincial government ministries and agencies, but also included outdoor groups and naturalist clubs.

This year's partners span the whole social, economic and environmental spectrum: provincial and federal governments; outdoor clubs; provincial, national and international conservation groups; universities, colleges and schools; commercial, industrial and tourism businesses; municipal and regional governments; First Nations groups; U.S. Columbia Basin organizations; individual residents; and more.

Hopefully, this trend will continue to be the sign of the times. A wide and growing range of human-caused activities is increasing pressures on fish and wildlife populations and their habitat in the region. It will take an equal range of partners working together to achieve and maintain a healthy Columbia Basin ecosystem for resident fish and wildlife populations.

Another significant partner this year is the **Columbia Basin Trust** with whom CBFWCP entered into an agreement to deliver 10 CBT-funded wildlife projects as part of their Terrestrial Community Environmental Projects.
Of the 47 projects this year, 25 are addressing species at risk of which four of these are initiatives for the recovery of endangered species: upper Columbia white sturgeon, northern leopard frog, East Kootenay badger and mountain caribou.

We would like to extend a warm welcome to **Greg Mustard** as the new public representative for the southeast Kootenays on the **CBFWCP Steering Committee**. Greg is replacing **Jim Zimmerman** who served in that position for seven years. We would also like to thank the EK organizations that participated in the nomination process and helped us choose a very qualified person from an excellent field of candidates. We are looking forward to Greg's contributions in bringing the perspectives and needs of local conservation groups and communities to the Steering Committee and helping facilitate local dam-related fish and wildlife projects. Greg's contact information is in the **Organization & Team Member Profiles** section of this handbook.

And a familiar face in a new role is **Bob Forbes**, MWLAP Fish & Wildlife Section Head for the Kootenay Region, who is now interim chair of the CBFWCP **Fish Technical Committee** until a new MWLAP Kootenay region senior fish biologist is in place.

The fertilization projects are currently without a co-ordinator with the recent leaving of Beth Wright for a position in Ontario. We are working with the **Ministry of Water, Land & Air Protection** to hire a new Large Lakes Biologist for this critical position and intend to have a qualified person on board as soon as possible.

The Compensation Program and partners have completed an estimated 430 fish and wildlife projects since 1995/96. Many of these projects have resulted in reports of value and interest to our stakeholder groups, research community, resource managers, students and the general public. Starting with this handbook, we are listing related reports with the projects that readers can view and download from our website **www.cbfishwildlife.org**.
Please let us know of any additional CBFWCP project reports that you think should be added to the website. Thank you.

Sincerely

Maureen DeHaan, Program Manager

CO-CHAIRS REPORT

The Columbia Basin Fish & Wildlife Compensation Program delivered 42 fish and wildlife projects in conjunction with 96 partners at a cost of $3,786,673 during the 2001 – 02 project year. These included 27 projects that were initiated, supported and/or assisted in the delivery by local community groups.

These projects also included the participation in three red-listed species recovery initiatives for the Northern Leopard Frog, East Kootenay Badger and upper Columbia White Sturgeon after extensive research efforts provided sufficient data to understand causes for these species' decline.

Fish Project Results

In the Fisheries Program, CBFWCP is pleased to be able to support the recovery of white sturgeon through financial support for hatchery production. With the population estimated at only 1,400 sturgeon in the entire upper Columbia system and very few juveniles, scientists recognized it was imperative to increase the juvenile population immediately in an effort to prevent the species' extinction. The **Upper Columbia White Sturgeon Recovery Initiative**, which is comprised of over 25 partners in the Canada-U.S. Columbia Basin, has utilized the Hill Creek hatchery facility as a pilot project to rear 9,000 juveniles for release in the upper Columbia during 2002. The hatchery operations have been carried out by the **Ministry of Water, Land & Air Protection**.

We are confident that two of the largest lake restoration projects in the world we are delivering are providing a good return on the investment. The fertilization and spawning channel operations costs collectively support kokanee populations at a cost of $1.4 million. The **Arrow Lakes Reservoir Experimental Fertilization Project** has helped significantly increase kokanee populations, the primary food source for adult rainbow trout, bull trout and sturgeon and an ecosystem health indicator, from seven million in 1999 to an estimated 20 million in 2001. The Kootenay Lake project has resulted in an increase in kokanee populations from 12 million in 2000 to 21 million in 2001. As can be expected, spawning channel kokanee escapement has also increased significantly with 431,300 spawners in the Meadow Creek channel (up from 377,700 in 2000) and 142,103 spawners at the Hill Creek channel (up from 56,606 in 1997 before fertilization in the upper Arrow began).

These lake restoration projects are also benefiting the local sport fishery as a by-product through the preservation of resident trout and char populations. For example, the current economic value of the Arrow Lakes Reservoir sport fishery is estimated at over $1 million dollars annually. A similar economic value is expected from the Kootenay Lake sport fishery.

Radio telemetry projects to better understand the critical habitats for the staging, spawning, and rearing of blue-listed bull trout in the Arrow Lakes Reservoir and the upper Kootenay systems were completed in the 2001 – 02 project year. Similar projects have been completed in the Duncan River by **BC Hydro** and in the Kinbasket Reservoir. The goal is to identify critical habitats for protection and enhancement/restoration to improve natural spawning production for the long-term conservation and management of this species.

Wildlife Project Results

Two initiatives commencing in this Program year to preserve the endangered leopard frog and badger from extinction in BC represent a turning point for the Compensation Program where six years of research have translated into on-the-ground recovery projects.

CBFWCP biologists reared and released 500 juvenile frogs in the Creston Valley Wildlife Management Area as part of the **Northern Leopard Frog Recovery Project** to supplement the only known population of this amphibian in BC estimated at 825-2431 individuals.

The **East Kootenay Badger Recovery Project** is breaking new ground in changing the attitudes and behaviour of the public and private landowners to reduce human impacts that are a cause of this species' decline. The support of a growing number of partners, including golf courses that are now promoting the presence of badgers and their primary Columbia ground squirrel prey as wildlife viewing opportunities instead of pests to be controlled, demonstrates the effectiveness of a well-planned public awareness campaign driven by solid research results to help protect an endangered species.

The loss of valley bottom grassland habitat due to construction of dams combined with the annual estimated loss of 3,000 ha of grassland a year to forest encroachment in the East Kootenay is putting tremendous pressure on species dependent on this habitat, including the badger. CBFWCP invests considerable resources annually toward grassland restoration though the **East Kootenay Enhancement Project** to compensate for the loss of valley bottom habitat. A 5-Year Summary of Achievements released in 2001 by the **Rocky Mountain Trench Ecosystem Restoration Committee** showed CBFWCP contributed to the restoration of 17,890 ha (3,578 ha per year) of grassland.

In the West Kootenay, CBFWCP and partners have enhanced an estimated 3,500 ha of ungulate habitat, primarily south-facing slopes degraded by fire suppression.

The Steering Committee is satisfied with the quality and results of CBFWCP fish and wildlife projects to date and anticipates this performance to continue into the future.

Wayne Stetski, Hugh Smith
CBFWCP Steering Committee Co-chairs

2001 – 2002 FINANCIAL REPORT

The Columbia Basin Fish & Wildlife Compensation Program began the 2001 – 02 project year with a fund deposit of $3,609,621 and a carry over of $236,374 from the previous year for a total budget of $3,845,995. This is up slightly from the previous year's total budget of $3,756,164. The carryover represents savings from land acquisition funds in that there were no land purchases in 2000-01.

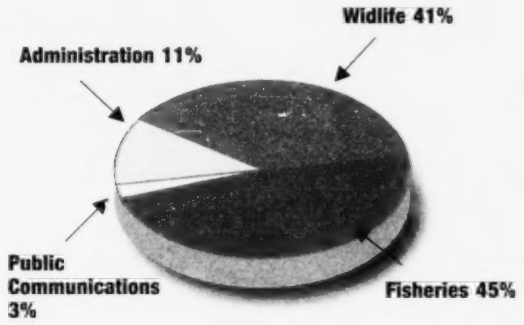
The Program is funded $3.2 million annually by BC Hydro, which is indexed for inflation from 1995 dollars.

The combined budget for the four components of Fisheries, Wildlife, Public Communications and Administration was $3,786,673, leaving a contingency of $48,652.

Fisheries underspent by $49,044 (3%) and Wildlife by $27,628(2%) as a result of reduced travel costs and project savings. Public Communications realized $21,913 (15%) in savings from ongoing efficiencies and project savings.

Administration costs were slightly over budget $13,916 (4%) due to unanticipated office repairs and additional meetings for the CBFWCP Steering Committee and the Upper Columbia White Sturgeon Recovery Initiative.

Overall, the Program completed the 2001-02 year with total expenditures of $3,694,148 and $151,847 (3.9%) under budget, which is carried over to the 2002-03 fiscal year.



Item	Credit	Expenditure	Balance
Carry over from March 31			236,374
Fund Deposit	3,609,621		3,845,995
Fisheries		1,677,463	2,168,532
Wildlife		1,497,022	671,510
Public Communications		122,675	548,835
Administration		396,988	151,847
Total		**$3,694,148**	

Fish and Habitat Enhancement Projects

Columbia Basin

FISH & WILDLIFE
Compensation Program

www.cbfishwildlife.org

FISH PROJECTS & OPERATIONS:

ARROW LAKES RESERVOIR

HILL CREEK SPAWNING CHANNEL OPERATIONS

Project # **F-95-L-010**

Project Technicians: Bob Millar, Fisheries Technician (Hill Creek)
Grant Thorp, Fisheries Technician (Nakusp)
Heather Cooke, Fisheries Technician (Nakusp)

Hill Creek ***Spawning Channel*** has been in operation since the early 1980's as part of BC Hydro's compensation for the impact of the construction of the Revelstoke and ***Hugh Keenleyside*** dams on fish populations and spawning habitat in the Arrow Lakes Reservoir. The channel is 3.2 km long with a capacity of 150,000 ***kokanee spawners***. The channel also provides CBFWCP with an effective indicator of the health of kokanee populations in the Arrow Lakes Reservoir and an index for how well the experimental ***fertilization*** project is working.

Kokanee spawner escapement has increased steadily since the fertilization project began in 1998. In 1997, there were 55,606 kokanee that returned to spawn at Hill Creek. In 2001, an estimated 137,000 kokanee spawned and deposited over 21 million eggs.

The channel requires ongoing maintenance to ensure an optimum level of spawner productivity and egg-to-fry survival. While the survival rate of eggs to fry in natural streams is 5 – 10%. In 2001, the 36% egg-to-fry survival rate in the channel resulted in an estimated 7.5 million fry escapement into the Upper Arrow. Hill Creek operations also include projects to evaluate fish-stocking in the Arrow Lakes Reservoir such as creel surveys and kokanee fry/adult enumeration.

Project Duration: Ongoing

Partners: **Ministry of Water, Land & Air Protection**

Related reports available @ **www.cbfishwildlife.org:**

Adult Kokanee Enumeration Summary 1998, December 1998

Kokanee Fry Enumeration Summary 1998, December 1998

HILL CREEK WHITE STURGEON HATCHERY PILOT PROJECT

Project # **F-02-NM-009**

Project Manager: Laird Siemens, Kootenay Hatchery Manager (Cranbrook)

Project Technicians: Ron Ek, Fish Culturist (Kootenay Trout Hatchery)
Diana Koller, Fish Culturist (Hill Creek)
Rachel Broadhead, Assistant Fish Culturist (Hill Creek)

The Hill Creek Hatchery was originally constructed over 20 years ago as part of BC Hydro's compensation requirement to restore kokanee, bull trout and rainbow trout populations in the Arrow Lakes Reservoir impacted by the construction of Hugh Keenleyside and ***Revelstoke Dams***.

Hatchery trout production was reduced and then suspended in the late 1990's with the imminent collapse of the Arrow ecosystem and resident kokanee populations, the primary food source of adult bull trout and rainbow trout (see Arrow Lakes Reservoir ***Fertilization*** and Monitoring).

The Upper Columbia White Sturgeon Recovery Initiative (UCWSRI) was launched in 2000 after nearly a decade of research by BC Hydro and MWLAP estimated only 1,400 adult sturgeon remaining in the entire upper Columbia River system and almost no sturgeon under 30 years old. This suggests a population of ageing fish with relatively few young, low reproductive success and low fry survival rates.

As a result, the upper Columbia white sturgeon has been ***red-listed*** as a critically imperilled species in British Columbia requiring urgent attention to prevent its extinction.

While the specific causes of the population's dramatic decline are not fully understood, several factors are being investigated including habitat changes associated with dam construction and operation, pollution by municipal and industrial users, introduction of exotic species such as walleye, and harvest.

Bold and italic text – see Glossary for more information

The UCWSRI, which is comprised of over 25 provincial, federal, U.S., industry, First Nations, public and tribal agency stakeholders, identified an urgent need in the recovery process to substantially increase the juvenile population immediately. The goals were to help ensure a sufficient number of different age classes in the short term to avoid the population's disappearance and to learn more about habitat requirements and survival rates of juveniles. The availability of Hill Creek Hatchery provided the opportunity to begin juvenile sturgeon production a year earlier than other viable options under consideration. A second option was the more modern Kootenay Sturgeon Hatchery where fish culturists have been producing juvenile white sturgeon since 1999 to aid in the recovery of the critically-imperilled Kootenay River population. However, it would have required an additional year to modify that facility and there was concern over possible inter-basin disease transfer between the two white sturgeon subspecies that couldn't be answered in time.

Based on its availability, the Hill Creek Hatchery was modified and began sturgeon production on a pilot basis in 2001 with the assistance of Kootenay Sturgeon Hatchery staff.

In 2001, two captured female white sturgeon were spawned successfully at the hatchery and their eggs fertilized by five males to create four separate subfamilies. As a result, nearly 9,000 juvenile sturgeon were raised, tagged and released into the Columbia River between ***Hugh Keenleyside Dam*** and the U.S./Canada border.

The UCWSRI recovery plan goal is to produce 12,000 fish from six families annually to ensure sufficient genetic diversity in the Upper Columbia population.

Project Duration: Ongoing

Partners: **Ministry of Water, Land & Air Protection; BC Hydro; Upper Columbia River White Sturgeon Recovery Initiative**

ARROW LAKES RESERVOIR FERTILIZATION & MONITORING Project # **F-97-L-008**

Project Biologists: Elizabeth Wright; Harald Manson (Nelson)
Creel Survey Biologist: Steve Arndt (Nelson)
Project Technician: Heather Cooke
Contract Technicians: Glen Olsen (Nakusp); Alison Alder (Shelter Bay); Miles Crowley (Castlegar)
Contract Biologist: Don Miller (Balfour)

The ***Arrow Lakes Reservoir*** has been strongly influenced by the construction of a series of three dams (Keenleyside, Mica, and Revelstoke). These dams have permanently changed the flow dynamics and ***nutrient*** loading of the reservoir, and influenced native fish populations by flooding and/or blocking migration to spawning and rearing habitat, altering water quality and decreasing reservoir productivity.

In addition, ***mysid shrimp*** introduced by fisheries managers into the reservoir in 1968 as a food source for young trout was found to compete with ***kokanee*** for the same ***zooplankton*** food source.

Prior to ***fertilization***, kokanee stocks had shown dramatic declines in both spawner escapement and spawner size in both the Upper and Lower Arrow Reservoir. After three years of fertilizing using a blend of ***nitrogen*** and ***phosphorus***, there have been documented improvements in the food web of Arrow Reservoir, most notably increased ***phytoplankton*** biomass and higher numbers of in-lake and spawning kokanee.

Hydro-acoustic (sonar) surveys conducted last fall estimate a total of 20 million kokanee in the Arrow Lakes Reservoir—a 72% increase over 2000 and a 228% increase over 1999.

As well as an increase of in-lake kokanee abundance, an aerial survey of spawning kokanee in 28 Arrow tributaries by BC Hydro and Ministry of Water, Air & Land Protection counted 670,635 spawners in 2001, an increase of 48% over 2000.

This ecosystem response to the fertilization may be a contributing factor in the re-opening of the Upper Arrow kokanee fishery with a daily catch limit of five fish.

Project biologists expect to have sufficient data to more accurately determine the benefits of the fertilization operation after this 5-year experimental project is completed in 2004.

Detailed sampling is being conducted in tandem with the fertilizing to ensure the nutrient additions are maintained at the optimum level and continue to have the desired effect on restoring reservoir productivity.

As well as conserving fish populations, this project is benefiting the local sport fishery, estimated to be worth over one million dollars annually, and providing a better food source for wildlife predators and scavengers (bears, eagles) by increasing the number of kokanee spawners.

The recently completed report on the 1998 – 99 Arrow Lakes Reservoir ***Creel Survey*** is providing baseline data to track the effectiveness of the fertilization project and potential benefits to the sport fishery.
According to creel survey results, the total estimated fishing effort in 1998 was 10,223 angler-days and 48,255 rod-hours with an estimated harvest of 1,338 ***bull trout***, 1,884 rainbow trout, 10,115 kokanee and 175 ***burbot***. In 1999, the estimated effort was 9,139 angler-days and 41,075 rod-hours, with harvest estimates of 791 bull trout, 1,766 rainbow trout, 8,461 kokanee and 122 burbot. The Upper Arrow was closed to kokanee harvest in 1999.
The size distributions of rainbow trout were similar for the two years, with most fish measuring 25 – 50 cm in length and weighing less than 1 kg. Rainbow trout over 5 kg were caught in both years, but these represented a very small proportion of the total catch.
Harvested bull trout measured 35 – 95 cm in length and weighed up to about 5.5 kg in both years. Mean weights were 1.9 kg in 1998 and 2 kg in 1999.
The mean length of kokanee was 22.3 cm and the weight was 147 grams in 1998. The majority of the kokanee fishery occurred in the Lower Arrow. For bull trout and rainbow trout, the majority of effort and harvest occurs in the Upper Arrow. Burbot angling effort was minimal with a harvest level of less than 200 fish annually. However, burbot catch-per-unit-effort was high. Biologists are in the process of analyzing creel data collected in 2000 – 01.
One of the goals of the fertilization project is to maintain annual kokanee escapement to the Hill Creek ***Spawning Channel*** and other Upper and Lower Arrow tributaries at 450,000 spawners.
Project Duration: Year 4 of 5
Partners: **BC Hydro; Ministry of Water, Land & Air Protection; Ministry of Transportation; Columbia Power Corporation/Columbia Basin Trust; University of British Columbia**
Related reports available @ **www.cbfishwildlife.org:**
Arrow Lakes Reservoir Fertilization Experiment: Year 1 (1999 – 2000) Report, 2000
Arrow Lakes Reservoir Limnology and Trophic Status: Year 2 (1998 – 99) Report, 1999
Arrow Lakes Reservoir Creel Survey & Contribution of Hatchery Production in 1998 and 1999, June 2002

GEOGRAPHIC LOCATION: REVELSTOKE

LAKE REVELSTOKE RESERVOIR BULL TROUT RADIO TELEMETRY Project # **F-00-M-014**
Project Biologist: Karen Bray, Fisheries Biologist (Revelstoke)
Contract Biologist: Peter Mylechreest (Revelstoke)
While bull trout are well adapted to live in the rugged, glacial environment of the Canadian Columbia River system, this blue-listed member of the char family is sensitive to human-related impacts such as logging, hydroelectric development, mining, urban development and angling.
The life history of bull trout in Revelstoke Reservoir is poorly understood including their critical habitats for staging, spawning, and rearing. This study will contribute to our understanding of spawning migrations and the distribution of critical habitat by radio ***tagging*** bull trout well in advance of spawning and following them by ground and aerial tracking.
In the first year, biologists radio tagged and tracked 28 bull trout. Spawning locations and timing were determined in eight watersheds. Tracking continued periodically through the winter to look for fish distribution and possible overwintering locations in the reservoir.
This year, biologists implanted bull trout with the remaining tags as well as tags retrieved from mortalities. All fish are being tracked to identify additional bull trout staging and spawning areas. Redd site locations and habitat characteristics identified in 2001 are also being investigated.
It is anticipated that at least two more years of ***telemetry*** are required to assess variability and confirm project findings. Subsequent inventory work would focus on key areas identified by the radio telemetry.
This information is valuable for managing and protecting adfluvial (living in the lake, spawning in tributaries) bull trout by identifying critical habitats and timing of spawning runs.
This task is the final phase of a basin-wide bull trout telemetry study, which began in 1995 with Duncan River bull trout and continued with the Arrow and ***Kinbasket Reservoir*** in 1998.

Project Duration: Year 2 of 4
Partners: **Downie Timber Ltd.; LP Engineered Wood Products Ltd.; Revelstoke Community Forest Corporation; Forest Investment Account; Local anglers**
Related reports available @ **www.cbfishwildlife.org:**
Lake Revelstoke Reservoir Bull Trout Radio Telemetry Progress Report, December 2001
Lake Revelstoke Winter Creel Survey Progress Report, January 2001
Lake Revelstoke Creel & Visitor Use Survey, January 2001
Bull Trout Spawning Migrations in the Duncan River: Insights from Telemetry & DNA, April 2001

GEOGRAPHIC LOCATION: KOOTENAY LAKE

MEADOW CREEK SPAWNING CHANNEL OPERATIONS Project # **F-95-L-011**

Project Biologist: John Bell, (Nelson)
Fisheries Technician: Murray Pearson (Meadow Creek)
Contract Technician: Stan Baker (Meadow Creek)

Loss of spawning habitat for approximately 2.8 million kokanee occurred with construction of the Duncan Dam. Prior to the building of the dam, Meadow Creek was the most productive lower Duncan River tributary for spawning kokanee, supporting an estimated 700,000 of Kootenay Lake's North Arm total population of 1.4 million kokanee.

The Meadow Creek ***Spawning Channel*** was built in 1967 by BC Hydro to help compensate for the habitat loss as a result of Duncan Dam. The channel is 2.9 km long and provides over 26,506 m2 of ideal spawning habitat for 300,000 – 350,000 spawners.

The channel is progressively stepped from bottom to top to provide a stream gradient that will optimize production. In mid-August each year, prior to the arrival of kokanee, the channel is mechanically scarified and sediment accumulations are flushed downstream. Major maintenance and upgrades at the facility are also required from time to time, and can include channel modifications, gravel, weir, bridge replacements and John Creek Diversion flood protection.

Spawners are counted as they enter into the channel each fall and fry production is measured each spring. The goal is to accommodate an annual return of 350,000 kokanee spawners and achieve an egg-to-***fry*** survival ratio over 35% to produce 15 – 20 million kokanee fry.

Kokanee provide the forage base for adult ***bull trout*** and ***Gerrard rainbow trout*** as well as sturgeon and burbot. The spawning channel also serves as a base for kokanee egg collection operations for the provincial fish culture program.

Monitoring of adult escapement to Meadow Creek and nearby reaches of the Lardeau River is undertaken each year to measure trends in kokanee abundance. ***Fry*** production is measured each spring.

In 2001, an estimated 431,300 kokanee returned to spawn at Meadow Creek compared to 377,700 in 2000. These spawners deposited over 50 million eggs, the highest since the mid-1990's, which resulted in an estimated fry production of over 20 million fish from the channel down into Kootenay Lake last spring. This represents an egg-to-fry survival rate of over 40%.

Project Duration: Ongoing
Partners: **Ministry of Water, Land & Air Protection**

KOOTENAY LAKE FERTILIZATION & ADAPTIVE MANAGEMENT Project # **95-L-012**

Project Biologist: Elizabeth Wright; Harald Manson (Nelson)

Contract Biologist: Don Miller

Contract Technician: George Veale

The ***fertilization*** of the North Arm of Kootenay Lake to restore a decline in nutrients caused by upstream dams is now in its 11th year of operation. Kootenay Lake has been impacted by the construction of the Libby Dam in Montana that flooded a large section of the Kootenay River as well as the ***Duncan Dam*** that raised Duncan Lake and flooded part of the lower Duncan River. These dams have permanently changed the flow dynamics and nutrient loading of Kootenay Lake which resulted in a significant decline in both the size and number of ***kokanee***.

When the five-year Kootenay Lake Experimental Fertilization Project began in 1992 with funding from BC Hydro and MWLAP, the impoundment of ***nitrogen*** and ***phosphorus*** by the dams had depressed plankton food abundance to a point where kokanee populations had declined to an estimated five million fish in the system. By the end of the five-year project, the plankton biomass including the ***zooplankton*** food source for kokanee had increased fourfold and hydro acoustics estimated a total of 35 million kokanee in Kootenay Lake.

Scientists then experimented with the levels of liquid nitrogen-phosphorus nutrients added to determine the optimum amount to maintain historic productivity levels. They calculated that 47 metric tonnes annually was the maximum amount of fertilizer to dispense and 30 metric tonnes the minimum to maintain a population of 25 – 35 million kokanee in Kootenay Lake.

Biologists now know the upper and lower limits of fertilizer levels and will make adjustments as needed in future years.

Hydro-acoustics conducted last fall estimated a total of 21 million kokanee in Kootenay Lake. The combined kokanee escapement to the Meadow Creek Spawning Channel and the Lardeau River was over 594,000 spawners. The goal is to achieve and maintain 750,000 spawning kokanee annually.

Anecdotal evidence indicates the fertilizing of the North Arm is providing some benefits to the South Arm as well with anglers reporting bigger kokanee and rainbow trout. However, the greatest impact on the South Arm fishery continues to be the impoundment of nutrients by Libby Dam on the Kootenai River in Montana.

Biologists are also continuing to monitor the ***mysid shrimp*** very closely. These shrimp were introduced into Kootenay Lake in the late 1940's as a food source for juvenile rainbow trout, but were discovered to compete with kokanee for the same zooplankton food source.

While the primary purpose of the fertilization operations is specifically to restore lake productivity and kokanee abundance, biologists expect better angling opportunities for rainbow and bull trout over the next few years as a byproduct of the fertilizing. However, other factors including lake levels and angling pressure can have an effect on fish populations.

This project is resulting in major conservation benefits to Kootenay Lake fish populations and the sport fishery, particularly for kokanee, bull trout and ***Gerrard rainbow trout***. In addition, sturgeon and ***burbot*** as well as wildlife predators and scavengers including bears and eagles will benefit from the increased food supply.

Project Duration: Ongoing

Partners: **University of BC; Ministry of Water, Land & Air Protection; BC Hydro**

Related reports available @ **www.cbfishwildlife.org:**

Kootenay Lake Fertilization Experiment Year 8 (1999 – 2000) Report, July 2002

Bold and italic text – see Glossary for more information

GEOGRAPHIC LOCATION: BASIN-WIDE

KOKANEE SPAWNING SURVEYS Project # **F-96-L-016**

Project Biologists: Bill Westover, Fisheries Biologist (Cranbrook)
Karen Bray, Fisheries Biologist (Revelstoke)

Kokanee are the 'canaries of the mine' in reflecting the health of lake ecosystems and reservoirs in the Columbia Basin. This project combines ongoing kokanee spawning surveys in the Arrow Lakes, Kinbasket and Koocanusa reservoirs and Kootenay Lake to collect data and monitor long-term trends on kokanee abundance.

Kokanee have become a keystone species in these reservoirs and support the sport fishery as well as provide forage for the blue-listed (vulnerable) ***bull trout***. Kokanee escapement provides a relatively inexpensive index to the health of the fish communities in these reservoirs.

Helicopter surveys conducted during the fall 2001 kokanee spawning runs indicate kokanee abundance continues to increase in all reservoirs.

The survey of upper Kootenay River and 10 tributary streams of the ***Koocanusa Reservoir*** estimated 351,700 kokanee spawners, up from 328,747 in 2000. Biologists consider the Koocanusa population to be healthy and stable.

Kokanee escapement in Arrow Lakes Reservoir tributaries was estimated at 670,635, a four-fold increase over 1997.

Kokanee spawning in Kootenay Lake is largely limited to the Meadow Creek Spawning Channel and the Lardeau River. Total escapement was over 594,000 spawners compared to 540,700 in 2000.

An estimated 446,000 spawning kokanee were counted in 11 stream tributaries to Kinbasket Reservoir and the upper Columbia River, compared to 330,000 in 2000. Six tributaries to the upper Columbia River accounted for 92% of these spawners with the Columbia River at Fairmont Hot Springs and Luxor Creek being the two most important spawning habitat in the upper Columbia River basin. Despite low reservoir water levels in 2001, kokanee had little difficulty accessing tributaries.

In 2002 – 03, biologists are conducting kokanee spawner counts in 11 streams in the Upper Kootenay River Basin, 6 streams in the Upper Columbia River Basin, 13 tributaries to Kinbasket Reservoir and 3 tributaries to Lake Revelstoke Reservoir.

The goal is to monitor spawner escapement on a continuing basis as an indicator of changes in the fish communities in reservoirs impacted by dams and powerhouses.

Duration: Ongoing

Partners: **BC Hydro; Ministry of Water, Land & Air Protection**

Related reports available @ **www.cbfishwildlife.org:**

Kinbasket Lake Kokanee Enumeration, December 2001
Koocanusa Kokanee Enumeration, December 2001
Camp Creek Kokanee Spawner Survey, March 2001

FISHERIES PROGRAM DELIVERY – SMALL WORKS PROJECTS

Project Biologist: Harald Manson, Senior Fisheries Biologist (Nelson)

Well-planned and coordinated projects using a combination of biologist expertise, volunteer time and limited funds can stretch resources to successfully deliver many small, yet important, fisheries enhancement activities. This project will identify and develop small works projects, collect background information, identify appropriate partners and evaluate completed enhancement projects on an ongoing basis.

To encourage local community involvement and to provide project opportunities for motivated conservation groups, CBFWCP set aside $50,000 this year for fish projects up to $10,000 per project for which local groups can submit proposals anytime during the Program year.

The Small Works projects give CBFWCP some flexibility in working with local groups to deliver less costly works that arise during the program year. A by-product of working with community groups is increasing the public's understanding and active support of fish and their habitat requirements.

Project Duration: Ongoing

Partners: **Various community groups**

Related reports available @ **www.cbfishwildlife.org:**

Small Works Project Application

Bold and italic text – see Glossary for more information

Small fish projects for this year include:

GEOGRAPHIC LOCATION: LOWER COLUMBIA & KOOTENAY DRAINAGE

MURPHY CREEK SIDE CHANNEL SPAWNER COUNTS & INTAKE MONITORING

Project Biologist: Steve Arndt, Fisheries Biologist (Nelson)

The Trail Wildlife Association (TWA) constructed and maintained a side channel of Murphy Creek below Highway 22 in the early 1990's after discovering rainbow trout were unable to access the upper stream because of a highway culvert and the velocity of the current.

A new intake was installed in the side channel of Murphy Creek in 1999. In 2001, the Ministry of Transportation installed rock weirs in the culvert to reduce water velocity and improve fish passage.

Gravel was added to the channel and some pool outflows were upgraded this spring with the help of Trail students from JL Crowe Secondary School's Fish & Wildlife Class.

Biologists are monitoring the numbers of spawning rainbows as well as water levels to ensure the channel is functioning effectively.

Project Duration: 1 Year

Partners: **Trail Wildlife Association; Columbia-Kootenay Fisheries Renewal Partnership; Columbia Power Corporation; Peter Kiewit Sons Ltd.; Ministry of Transportation; JL Crowe Secondary School; BC Hydro**

Related reports available @ **www.cbfishwildlife.org:**

Effect of an Artificial Side Channel on Fry Production and Rearing Densities of Rainbow Trout in Murphy Creek, October 2001

BLUEBERRY CREEK BARRIER EVALUATION & MITIGATION

Project Biologist: Steve Arndt, Fisheries Biologist (Nelson)

Volunteer Co-ordinators: John Cameron (Blueberry)
Grace Conzon (Trail)

Blueberry Creek is a tributary of the Columbia River near Trail that provides productive spawning and rearing habitat for rainbow trout that can no longer access tributaries upstream of Keenleyside Dam. CBFWCP has been involved with local residents and the Ministry of Transportation in evaluating three man-made barriers for possible modifications in the lower reaches of the creek. Work to improve fish passage has been completed at all three barriers. MoT has provided the bulk of funding and CBFWCP has assisted in design and monitoring. Volunteers and biologists monitoring the rainbow trout spawning run this year have confirmed passage over the Blueberry Creek Irrigation water intake dam. Landowners reported that fish have been seen spawning upstream of the canyon. This indicates fish should be able to access the entire 18-kilometer drainage system from the Columbia River up to Nancy Greene Lake. Biologists are working with MoT and landowners to evaluate the success of past work and identify additional opportunities to further improve fish passage.

Duration: 1Year

Partners: **Trail Wildlife Association; Blueberry Creek Irrigation District; Local Volunteers; Ministry of Transportation; BC Hydro**

Related reports available @ **www.cbfishwildlife.org:**

Blueberry Creek Remediation, January 2001

Assessment of Rainbow Trout Passage at Three Man-made Obstructions on Blueberry Creek, October 2001

SPROULE CREEK CULVERT PASSAGE & REHABILITATION

Project Biologist: Steve Arndt, Fisheries Biologist (Nelson)

Volunteer Technician: Stewart Petersen (Nelson)

Sproule Creek cascades over an impassable falls and flows 230 m before entering the Kootenay River west of Nelson.

Historically, this lower reach of the tributary below the falls was accessible to adult rainbow trout from the Kootenay River for use as spawning and early rearing habitat. But the force of water through the stream culvert had lowered the plunge pool so that fish passage was restricted to years of high water levels in Kootenay River.

which are determined by seasonal and annual variations in river discharge and Cora Linn dam downstream. As well, the straightening of the stream to accommodate a highway culvert had removed critical woody debris, rocks and spawning gravel.

CBFWCP biologists undertook an in-stream assessment to gauge the potential for ***rehabilitation*** and conducted two years of monitoring to measure fish usage and impediments.

This work determined that most of the channel offered little depth or hiding cover (large woody debris, rock clusters) for older juveniles, and the substrate was too large for good spawning. They found no ***fry*** emigrating from upstream of the culvert but observed large numbers of fry in the creek immediately below the culvert, suggesting that spawners had not been able to get through in those years.

However, upstream assessments also indicated that Sproule Creek had ideal summer temperatures and good potential for trout spawning and rearing if the habitat was ***restored***. An engineer's report provided specifications for rehabilitating the lower reach of the CBFWCP portion of Sproule Creek according to Watershed Restoration manual techniques.

Biologists addressed the spawner access problem by building two rock weirs below the outlet of the Highway 3A culvert to raise the water level and allow easier entry and passage through the culvert. Habitat restoration involved the installation of three rock weirs and three large boulder clusters in the straightened section to provide deeper channels for fry rearing.

Last fall, NDRGC volunteers added spawning gravel to the pool tailouts along the lower reach to complete the rehabilitation project. Since then, efforts have been focussed on monitoring the stability of the structures and measuring the number of emigrating fry and juveniles rearing at the creek.

A large trout from below the culvert was observed spawning upstream near the falls which confirms the culvert work was successful in improving passage. Some fry were observed in the creek by early August and biologists expect an increase in spawners and fry in future years. The high-velocity freshet this year tested the instream structures with generally positive results. The rock clusters worked fairly well as did two of the three weirs. However, a large amount of bedload movement occurred as the freshet rolled cobble-size rocks downstream that filled in the pools above the weirs.

The instream structures are now being evaluated which will result in recommended modifications. Electrofishing is also being conducted to compare fish densities with previous years.

The NDRGC recently received the coveted Dr. Louis Lemieux Conservation Award from the BC Wildlife Federation for this Sproule Creek project.

Duration: 1 Year

Partners: **Nelson District Rod & Gun Club; Columbia Power Corporation; Ministry of Transportation; Sprouler's Enterprises Limited; Teck Cominco; Patagonia/Snowpack Outdoor Experience**

Related reports available @ **www.cbfishwildlife.org:**

Sproule Creek Restoration, January 2002

Sproule Creek Fish Habitat Rehabilitation Assessment, December 2002

CHINA CREEK HABITAT INVENTORY

Project Biologist: Steve Arndt, Fisheries Biologist (Nelson)

Local residents have reported there is fairly productive habitat in the upstream portion of China Creek, a tributary to the lower Columbia River. However, a highway culvert appears to be a barrier to fish passage. In 2001, CBFWCP inventoried habitat for 1 km upstream of a highway culvert and provided this information to MoT and WLAP to assist with attempts to provide fish passage. This year, biologists are conducting fish jump counts to gather data in preparation for modifications inside the culvert by MoT. CBFWCP will monitor fish passage through the culvert and assist with additional work at the culvert outlet, such as raising the plunge pool.

Future work may also include installing baffles in the culvert to reduce water velocity and improve opportunities for fish passage.

Duration: 1Year

Partner: **Ministry of Transportation; Ministry of Water, Land & Air Protection; Columbia Power Corporation; Local volunteers**

SALMO RIVER RAINBOW TROUT HABITAT USE

Project Biologist: Steve Arndt, Fisheries Biologist (Nelson)

Contract Biologist: James Baxter (Nelson)

The Salmo River Watershed supports one of the few riverine rainbow trout populations in the West Kootenay area. This population has been affected by the construction of the Seven Mile Dam which impounded fish habitat in the lower Salmo River and prevented movement from the Columbia River. However, there is little information about the life history, population dynamics and habitat use of rainbow trout in the Salmo River watershed.

CBFWCP is assisting with snorkelling and baseline data collection to help identify future ***enhancement*** and ***rehabilitation*** opportunities, including an evaluation of ***restoration*** options for Barrett Creek. ***Telemetry*** flights were done last spring to locate spawning areas and refuge areas during freshets. The snorkel swims occurred during the summer and most of the fieldwork is now completed.

This project will help identify spawning, summering and overwintering areas of rainbow trout through the use of radio telemetry. This data will document critical habitats for conservation and identify whether habitat restoration options should be focused on the Salmo River mainstem or tributaries. The radio ***tags***, in conjunction with snorkel surveys, will help derive a population estimate in the mainstem.

Duration: 1Year

Partners: **Salmo Watershed Streamkeepers Society; BC Hydro; University of BC; Ministry of Water, Land & Air Protection**

LOWER COLUMBIA RAINBOW TROUT STUDIES

Project Biologist: Steve Arndt, Fisheries Biologist (Nelson)

CBFWCP has conducted counts of emigrating trout from suspected important tributaries in the lower Columbia River in the previous two years. Findings include approximately 80,000 fry emigrated from each of Murphy and China Creeks and 20,000 from Blueberry Creek by early August, 2000.

In 2001 an analysis and report was completed to determine whether the elemental composition of scales could separate trout juveniles rearing in the tributaries from those rearing in the mainstem Columbia River. This is a relatively new and non-lethal technique in which scale samples are gently removed and vaporized to quantify trace elements that should reflect the elemental ratios in the water inhabited by the fish. Fry are too small and too numerous to effectively use conventional mark-and-recapture methods such as fin clips or PIT tags.

While this method was not successful in separating rearing areas, it did show a significant decrease in certain elements in the Columbia River below Trail after a new treatment method was brought on line by Cominco in 1997. This project will investigate other methods such as using growth differences in tributaries and the mainstem to identify rearing areas with the ultimate goal of determining the importance of tributary spawning and rearing habitat to the production of trout in the Columbia River.

Project Duration: 1 Year

Related reports available @ **www.cbfishwildlife.org:**

Columbia River Trout Elemental Scale Analysis, January 2002

NORNS CREEK HABITAT REHABILITATION MONITORING

Project Biologist: Steve Arndt, Fisheries Biologist (Nelson)

Volunteer Co-ordinator: Fred Salekin (Castlegar)

Biologists and local volunteers are monitoring ***rehabilitation*** work completed in previous years on Norns Creek, considered one of the most important spawning tributary of the Columbia River below ***Keenleyside Dam*** for rainbow trout. However, the availability of spawning gravel and the number of spawners had decreased since 1990. This project was designed to improve spawning conditions for rainbow trout and ***enhance*** rearing habitat for juvenile rainbow trout.

Log structures were built in 1999 and a 65 metre-long eroding bank was stabilized in 2000 using a combination of rip-rap and bioengineering methods. Another 200 cubic metres of graded rip-rap was used to protect the bank up to the bankful elevation. Two rock spurs were then integrated into the rip-rap to direct flows away from the bank during significant discharges such as freshets. Finally, the area upslope of the rock work was treated with a mixture of grasses, coconut mats and live willow-dogwood stakes to increase root mass.

These structures have formed productive pools and good tailouts. ***Kokanee*** have been observed using their enhanced spawning habitat and juvenile trout are using the log structures and riprap. The structures continue to be stable and performing well after three freshets. In addition, rock groins are proving effective in directing the current away from an eroding bank near the confluence of the Columbia River.

BC Hydro has also contributed to the overall rehabilitation of Norns Creek by recontouring portions of the fan used by rainbow trout as spawning and rearing habitat at the mouth of the stream on the Columbia River. The recontoured fan is designed to significantly reduce the incidents of fish stranding in pools when dam operations decrease flow volumes on the Columbia River, while maintaining spawning habitat availability.

Project Duration: 1 Year

Partners: **Castlegar & District Wildlife Association; Columbia Power Corporation; Peter Kiewit Sons Ltd.; Columbia-Kootenay Fisheries Renewal Partnership; BC Hydro**

Related reports available @ **www.cbfishwildlife.org:**

Norns Creek Fish Habitat Enhancement Report, December 2000

DEER CREEK HABITAT RESTORATION

Project Biologist: Harald Manson, Senior Fisheries Biologist (Nelson)

Volunteer Co-ordinators: John Erikson, Ken Carter (Deer Park)

Deer Creek is a tributary to the lower ***Arrow Lakes Reservoir*** that was identified in a 1996 fisheries assessment as requiring habitat ***enhancement***. A major impediment was a government water survey weir that blocked ***kokanee*** from accessing spawning grounds above the weir.

A new water survey metering station was installed in 2000 further upstream and above an impassable falls. In 2001, biologists worked with residents of Deer Park and Kalesnikoff Lumber, in partnership with Forest Renewal BC, to remove the obsolete water survey weir prior to September's kokanee spawning run. The removal of this obstruction is providing kokanee with access to an additional 1.4 km of spawning habitat.

This project is enumerating kokanee escapement and monitoring the use of this additional spawning habitat as well as identifying additional enhancement opportunities.

Duration: 1 Year

Partners: **Deer Creek Residents John Erikson & Ken Carter; Kalesnikoff Lumber; Forest Renewal BC; Water Survey of Canada**

Related reports available @ **www.cbfishwildlife.org:**

Deer Creek Remediation Report, December 2000

GEOGRAPHIC LOCATION: UPPER KOOTENAY

EAST KOOTENAY TROUT HABITAT REHABILITATION

Project Biologist: Steve Arndt, Fisheries Biologist (Nelson)

CBFWCP was approached by Trout Unlimited to partner in projects in East Kootenay rivers to benefit resident fish populations. This task is investigating areas such as the middle fork of the White River with the goal of developing fish habitat ***rehabilitation*** projects in the East Kootenay.

Duration: 1 Year

Partners: **Trout Unlimited; Ministry of Water, Land & Air Protection; Local Community Groups**

COLUMBIA LAKE BURBOT POPULATION ESTIMATE & JUVENILE DENSITIES

Project Biologist: Steve Arndt, Fisheries Biologist (Nelson)

Burbot, a freshwater member of the cod fish family, are a species of special concern in the Kootenays with ***red-listed*** (endangered) populations in Kootenay Lake, Kootenay River and Columbia River below ***Hugh Keenleyside Dam***.

CBFWCP has completed a six-year project gathering baseline biological information on burbot in Western Canada with a specific focus on monitoring the spawning behaviour of the Columbia Lake population. A UBC graduate student has also conducted a three-year study on the habitat requirements of juvenile burbot.

This project is providing the only burbot population estimate for any lake in the Kootenays. The information gained will help maintain the long-term sustainability of the burbot fishery in Columbia Lake.

This year, project biologists are completing a scientific report from the six years of field work which will be submitted to a scientific journal. The report will also be provided to resource managers and made available to other stakeholders interested in the conservation of burbot in Western Canada.

Duration: 1 Year

Partners: **Columbia-Kootenay Fisheries Renewal Partnership; Ministry of Water, Land & Air Protection; Local anglers**

Related reports available @ **www.cbfishwildlife.org:**

Columbia Lake Burbot Population Estimate Program at Canal Flats, June 2002
Movements of Burbot in Columbia Lake, British Columbia, for 18 Months After Spawning as Determined by Radio Telemetry, March 2001
Data Summary for the 2000 Upper Columbia Burbot Study, March 2000
Summary of 1995 – 2001Winter Creel Surveys for Columbia & Windermere Lakes, October 2001
The Early Life History and Ecology of Columbia Lake Burbot, May 2002
Columbia Lake Burbot 2001 Data Summary, June 2002

KINBASKET TRIBUTARY FISH PASSAGE IMPROVEMENT

Project Biologist: Karen Bray, Fisheries Biologist (Revelstoke)

Surveys of Kinbasket Reservoir tributaries in fall 2001 identified a number of debris jams blocking or restricting access for bull trout, particularly streams entering the Canoe Reach. The report recommended sampling be conducted and the blockages be further assessed for passage improvements or complete removal of debris.

Three tributaries in the Canoe Reach will be assessed this year and, based on the results, a plan for improving passage will be developed for implementation next year.

Duration: Year 2 of 3

Related reports available @ **www.cbfishwildlife.org:**

Kinbasket Tributary Assessment, February 2002

GEOGRAPHIC LOCATION: UPPER COLUMBIA

FISH DERBY MONITORING

Project Biologist: Karen Bray, Fisheries Biologist (Revelstoke)

CBFWCP biologists have been attending fish derbies on the Arrow, Revelstoke and Kinbasket reservoirs since 1997 to sample caught fish. CBFWCP does not endorse fish derbies, but is opportunistic in collecting data on fish populations in the reservoirs as a means of adding to our overall knowledge of the ecosystem.

Data collected from these derbies can be combined with other information on these reservoirs to give us a better picture of trends over time. Monitoring how ecosystems and populations are changing over time is a critical element for effective management.

Derbies are usually held in June (Nakusp) and July (Mica).

All fish are sampled with permission from the angler. Each fish is measured, weighed, and its sex and stomach contents recorded. Heads of ***bull trout*** are removed for extraction of otoliths (ear bones) while scales are taken from rainbow trout to determine fish age. In most years, scales were also taken from bull trout as well as a small piece of the caudal fin preserved in ethanol for DNA analysis.

Biologists use four measurements for fish population health and trends: length frequency; length versus weight; length at age; and condition factor of the fish.
A summary report for the first five years of derby surveys was released this year, primarily for the information of organisations and individuals that participated in the derbies.
The greatest value of these data lies in the long-term trends. For example, the condition factor in Arrow Lakes Reservoir bull trout began an upward trend in 1999 after the first summer of fertilizing in the Upper Arrow. But that same improvement has not been seen in the other two reservoirs. Biologists are very interested to see how this trend evolves in the future as the fertilization program continues.
Duration: Ongoing
Partners: **Revelstoke Rotary Club; Nakusp Conservation Association; Local Anglers; Mica Creek Volunteer Fire Dept.; Mica Creek Community Club; BC Hydro**
Related reports available @ **www.cbfishwildlife.org:**
Fish Derby Summary, March 2002

WORKING GROUP PARTICIPATION

Project Biologists: Karen Bray, Fisheries Biologist (Revelstoke)
Steve Arndt, Fisheries Biologist (Nelson)
Harald Manson, Senior Fisheries Biologist (Nelson)

CBFWCP fish biologists provide valuable technical support to other stakeholder groups conducting fish projects in the Columbia Basin. CBFWCP's involvement is based on the availability of resources and the degree to which the projects reflect the criteria and objectives of its Fisheries Program including impacts by BC Hydro dams. In many cases, these projects are addressing habitat and species needs that complement fish projects CBFWCP biologists are involved in delivering. These partnerships are resulting in additional information to help ***conserve*** fish populations and their habitat as well as identifying other potential fish projects.

These projects include:

SLOCAN RIVER TEMPERATURE MONITORING

Biologists are installing temperature recorders at selected fish habitat sites and collecting river temperature data. CBFWCP has conducted several projects on the Slocan River including Fish Habitat Assessment and Restoration Process (1998), Slocan River Summer Temperatures in 1997 and 1998: Implications for Rainbow Trout Distribution and Production, Slocan River Side Channel Feasibility Study (1997) and Slocan River Rainbow Trout Population Assessment (2000). This monitoring will provide more current information and help identify any trends that may have further impact on resident rainbow trout populations.
Duration: 1 Year
Related reports available @ **www.cbfishwildlife.org:**
Slocan River Summer Temperatures: Implications for Rainbow Trout Distribution & Production, 1999

RAINBOW TROUT HABITAT RESTORATION ASSESSMENT ON LOWER LARDEAU & DUNCAN RIVERS

CBFWCP biologists are assisting with an assessment of juvenile rainbow trout densities. The Lardeau River supports the only known spawning and rearing habitat for the 700 – 1,000 Gerrard rainbow trout that spawn annually. Most of the young fish move down the Lardeau River and saturate available rearing habitat with some fry entering the lake because all available rearing habitat is utilized. The increase in the productivity of Kootenay Lake and ***kokanee*** abundance as a result of ***fertilization*** activities presents an opportunity to increase trout numbers through the restoration of their spawning and rearing habitat. The Lardeau River, along with the nearby Meadow Creek ***Spawning Channel***, is also one of the most productive kokanee spawning habitats on Kootenay Lake.
Duration: 1 Year
Partners: **Ministry of Water, Land & Air Protection**

Wildlife and Habitat Enhancement Projects

Columbia Basin

FISH & WILDLIFE
Compensation Program

www.cbfishwildlife.org

ARROW LAKES VALLEY

WEST KOOTENAY UNGULATE ENHANCEMENT PROJECT

Project **#W00-NL-017**

Project Biologists: John Krebs, Senior Wildlife Biologist (Nelson)
John Gwilliam, Wildlife Biologist (Nelson)
Ross Clarke, Wildlife Biologist (Nelson)

Wildlife Technicians: Thomas Hill, Aaron Reid (Nelson)
Nicole Thomas, Shane Dennis (Pend d'Oreille)

Loss of valley bottom wildlife habitat from BC Hydro dams in the Columbia system has increased the importance of maintaining the productivity of remaining low elevation habitat. Low elevation, south-facing slopes provide critical winter habitat for elk and deer in the West Kootenay.

This project focuses on implementing ***enhancement/restoration*** opportunities and identifying new projects as well as conducting pre and post enhancement monitoring. Activities are primarily directed at maintaining early seral (phase after natural disturbance such as forest fire) conditions on ***ungulate*** winter range to mimic historical natural disturbance patterns. Fire traditionally played a key role in maintaining a mosaic of mature coniferous and open early seral habitat. ***Prescribed burning*** is used to mimic these natural disturbance patterns in a controlled fashion. When burning is not feasible, slashing is used as an enhancement tool, typically on deciduous shrubs that have grown out of the reach of browsing ungulates.

2002 – 03 activities include:

I Project Identification/Definition

- Investigating and cataloguing slashing/burning opportunities on the east shore of Kootenay Lake between La France Creek and Sanca Creek;
- Investigating prescribed burning/slashing opportunities along the lower Arrow Lakes including Dog Creek, Renata Creek, Johnson Creek, Slewiskin Creek, and the Inonoaklin River;
- Investigating prescribed burning/slashing opportunities at Blueberry Creek, Arrow Creek and Ministry of Water, Land and Air Protection property in Riondel and the west arm of Kootenay Lake;
- Investigating and developing Stand Management Plans for the creation of small opening treatment units at Crawford Creek; and
- Finalizing the Enterprise Creek to Summit Lake Enhancement Plan.

II Project Implementation

A) Arrow Lakes

The south slopes adjacent to Arrow Lakes Reservoir provide winter habitat for deer, elk and moose. Biologists are undertaking a number of enhancement activities to maintain and improve habitat values.

- Planning and executing NDT4 restoration through logging and slashing on 21 ha over four years on the Deer Creek Property;
- Implementing old growth enhancement treatment using slashing and/or thinning techniques on 5 ha within Hamlin Creek CBFWCP/MWLAP property;
- Conducting a 100 ha prescribed burn at Johnston Creek.

B) Pend d'Oreille/South Salmo River

The south slopes above the Pend d'Oreille River provide winter habitat for white-tailed deer while the slopes above the South Salmo River provide winter habitat for ***mule deer***, elk and ***Rocky Mountain bighorn sheep***. Fort Sheppard provides critical winter range for mule deer.

- Conducting 5 prescribed burns at Pete Creek (40 ha), Wallack Creek (40 ha), Eldorado Creek (20 ha), Billy Creek (20 ha) and Rorick Face near Limpid Creek (60 ha);

Bold and italic text – see Glossary for more information

• Slashing 10 ha of deciduous shrubs and trees that have grown out of reach of browsing white-tailed deer and elk in the McCormick Creek drainage (CBFWCP/WLAP property) in the Pend d'Oreille Valley;
•Selkirk College first year wildlife students will slash 3 – 4 ha of deciduous shrubs that have grown out of reach of browsing white-tailed deer in the Pend d'Oreille Valley on WLAP/CBFWCP property.

C) Kootenay Lake
• Conducting a prescribed burn on 35 ha at Grohman Creek;
• Slashing 5 ha of deciduous shrubs at Meadow Creek (CBFWCP/TNT Property);

D) Revelstoke/Big Bend
• Slashing deciduous shrubs and conifer ingrowth on a 5ha site near Cranberry Creek.
• Creating small openings on CBFWCP/BCE property near Wallis Creek.

E) Creston
• Slashing deciduous shrubs and conifer ingrowth on a 5 ha site in the Goat River Drainage.

III Project Monitoring
• Continuing vegetation monitoring of past enhancement activities at Deer Creek and post-burn plots at Rosebud Lake;
• Establishing pre-treatment plots on proposed burn sites as required by the Enhancement Monitoring Strategy;
• Mapping boundaries of enhancement sites using GPS;
• Compiling and summarizing vegetation monitoring data.

These three phases for habitat management are necessary over the long term basis to measure the effectiveness in ***conserving*** wildlife populations. Benefits include improved moose, elk and mule deer winter browse values as well as increased wildlife viewing and hunting opportunities.
Duration: Ongoing
Partners: **Habitat Conservation Trust Fund; Ministry of Water, Land & Air Protection; Ministry of Forests; Selkirk College; Creston Rod & Gun Club; New Denver Friends for Wildlife; Duncan-Lardeau Advisory Committee; North Arm Wildlife Club; Trail Wildlife Association; BC Hydro; Kalesnikoff Lumber**
Related reports available @ **www.cbfishwildlife.org:**
West Kootenay Mule Deer Progress Report, October 1999

SOUTH SELKIRK COUGAR ECOLOGY & PREDATION STUDY Project **#W98-M-125**
Project Biologist: Ross Clarke, Wildlife Biologist (Nelson)
Project Technician: Dave Lewis, Wildlife Technician (Invermere)
Houndsmen: Stu Hawes (Nelson); Dave Basaraba (Creston)
Cougars are suspected of being a contributing factor to the recent high rates of mortality of the ***red-listed*** (endangered) ***mountain caribou*** as well as mule deer populations in the South Selkirks. This project was initiated in 1998 to gather information on the South Selkirk cougar population to help reduce or reverse the losses of the mountain caribou to cougar predation. Biologists need to understand how cougars interact with caribou and other ungulates to aid in identifying the most effective options for conserving the endangered South Selkirk caribou herd.
This project is being carried out in conjunction with cougar research in the Washington and idaho portion of the caribou recovery area. The work is being co-ordinated through a graduater student from Washington State University.
The expertise and knowledge of local houndsmen were utilized in capturing and collaring 20 cougars over four winters in the 2,630 km2 study area south of the West Arm of Kootenay Lake and between Creston and Salmo.
Aerial ***telemetry*** locations of collared cougars were conducted on a weekly basis in conjunction with the West Kootenay Mule Deer Project during the winter and three times a week during the summer in conjunction with WSU. Collared caribou and ***mule deer*** mortality sites were investigated to determine the cause of deaths.
Biologists are in the process of analysing seasonal movements and home range data and designing a cougar population study using DNA analysis of hair samples. The goal is to help determine the extent of cougar predation on caribou and mule deer, whether all cougars or only specific individuals prey on caribou, and provide insight into

South Selkirk cougar population dynamics.
A final report is being prepared with recommendations for cougar management and future activities. This project will also result in improved knowledge of habitat requirements and ***home range*** needs of a hunted population of cougars in southeastern BC.
Project Duration: Year 5 of 5
Partners: **Habitat Conservation Trust Fund; Local houndsmen; Washington Dept. of Fish & Wildlife; Washington State University; Ministry Water, Land & Air Protection; Additional funding by Columbia Basin Trust**
Related reports available @ **www.cbfishwildlife.org:**
South Selkirk Cougar Ecology and Predation, January 2002
Predation & Habitat Ecology of Mtn. Lions in Southern Selkirk Mountains, July 2002
Cougar Predation and Population Growth of Sympatric Mule Deer and White-tailed Deer, April 2002

KOOTENAY LAKE

NORTHERN LEOPARD FROG RECOVERY PROJECT Project **#W00-NM-010**

Project Biologist: Doug Adama, Wildlife Biologist (Golden)
Field Biologist: Marc-Andre Beaucher (Creston)
Husbandry Technicians: Kate Lansley (CVWMA); Julie Mathews (CBFWCP)

Northern leopard frogs in British Columbia are listed as endangered both provincially and federally. While leopard frogs are among the most common amphibians in North America, populations in the west began declining dramatically in the 1970's. In B.C., these unique sounding amphibians historically occurred in the East Kootenays, Creston Valley and South Okanagan, but appear to be confined now to a single wetland compartment in the Creston Valley Wildlife Management Area (CVWMA).
Frogs live both on land and in water and are extremely sensitive to changes to the environment. Their skins are permeable, allowing air and water pollutants in the environment to be readily absorbed.
Since 1997, CBFWCP has employed a variety of techniques including radio ***telemetry***, calling surveys and habitat assessments to assess the status of the population, identify threats and describe their use of habitats to guide recovery efforts.
The results to date indicate that this species is indeed critically endangered. Research estimates a low resident population of only 1,200 adults and very low reproductive rates. A fungal disease (Chytridiomycosis), predation by introduced fish such as large mouth bass and black bullheads, and the loss and fragmentation of important habitats are identified as the major threats and are likely responsible for the decline. An additional impact on leopard frogs in the Columbia River system is the loss of habitat from the construction of hydro dams.
Biologists initiated a head-start program in 2001 to rear tadpoles in captivity to re-establish populations across their former range. The biologists successfully raised over 500 frogs that were released in a second wetland compartment in the CVWMA. The egg-to-froglet survival of the captive animals was between 75% and 85%, a significant increase from 1 – 7% observed in the wild. Based on the success of the 2001 pilot project, the head start program has been expanded considerably.
Biologists continue to rear tadpoles and release froglets in 2002. Breeding activity was slow due to a late spring but biologists have been able to obtain tadpoles from 3 separate egg masses. Over 3000 tadpoles were brought into captivity with the anticipated release of an estimated 2,500 froglets. No diseases have been detected in the captive population.
This year's project includes ***enhancement*** of breeding habitat by extending an existing channel and installing a culvert and gate to maintain water levels during dry summers. These measures will benefit long toed salamander, chorus frog and leopard frog larvae. Screens are also being installed at the inlet and outlet to prevent fish access.
Other planned activities include participating on a provincial recovery team, monitoring the existing population, assessing and enhancing habitat and expanding the captive rearing effort.

Future activities include redistributing leopard frogs to other suitable habitat within the CVWMA and exploring opportunities to reintroduce the species in the East Kootenays to expand their range in southeastern B.C. and reduce the threat of ***extirpation***.

Project Duration: Year 3 of 5

Partners: **Creston Valley Wildlife Management Area; Ministry of Water, Land & Air Protection; World Wildlife Fund; Environment Canada; Adama Wildlife Consulting; Additional funding by Columbia Basin Trust**

Related reports available @ **www.cbfishwildlife.org:**

Northern Leopard Frog 2000 – 01 Progress Report, March 2001

Northern Leopard Frog Recovery – CVWMA Fish Inventory

REVELSTOKE/BIG BEND

FEMALE WOLVERINE REPRODUCTION AND SURVIVAL Project **#W00-NM-015**

Project Biologist: John Krebs, Senior Wildlife Biologist (Nelson)

Wildlife Technician: Dave Lewis, Wildlife Technician (Invermere)

This project is an ongoing field study of ***wolverine*** demographics and completing reports arising from the first six years of the project.

Preliminary results suggest a probable decline of the ***blue-listed*** wolverine population in the 7,000 km^2 (study area encompassing Revelstoke, Mica Creek and Roger's Pass.

The objectives of the field portion of the project are to estimate age at first reproduction, birth interval, den site selection, kit production and survivorship. Monitoring of two radio-tagged female wolverines will continue to gather survival and reproductive data. Bi-weekly ***telemetry*** flights will continue to locate and determine live/dead status. Reproductive dens will be identified during flights between February and April. Kit production will be estimated from visual sightings once females have weaned kits and have vacated their reproductive dens.

Several reports are being completed including survivorship, habitat use and food habits.

Project staff have been providing input and contributing data into government initiatives such as fur harvest review, commercial backcountry recreation guidelines and resource management plans.

The objective of this project is to develop progressive management and habitat preservation techniques to ensure the long-term ***conservation*** of wolverine populations.

In addition, improved information on wolverine populations will be available to trappers, resource managers and scientific community as well as the general public.

Project Duration: Year 3 of 4

Partners: **Canada Parks Service; Habitat Conservation Trust Fund; BC Forest Service; Canadian Mountain Holidays**

Related reports available @ **www.cbfishwildlife.org:**

Wolverine Ecology and Habitat Use in the North Columbia Mountains: Progress Report, February 1999

UPPER KOOTENAY

EAST KOOTENAY ENHANCEMENT Project **#W00-NL-018**

Project Biologists: Larry Ingham, Wildlife Biologist (Invermere)
Doug Adama, Wildlife Biologist (Invermere)
John Krebs, Senior Wildlife Biologist (Nelson)

Loss of valley bottom wildlife habitat from BC Hydro dams has increased the importance of maintaining the productivity of remaining low-elevation habitat.

Over the last several decades, forest in-growth has resulted in an estimated loss of 3,000 hectares annually of open grassland and open forest communities in the East Kootenay Trench. The result has been the concentration of native and domestic ***ungulate*** grazing which has had negative consequences to both grassland habitats and native wildlife populations. The loss of these habitat types has been related to the decline of wild ungulate populations and the ***extirpation*** of Columbian ***Sharp-tailed grouse***. In response to this crisis, a variety of agencies have been

working with government, particularly Ministry of Forests, to reverse this trend to benefit wildlife and other non-timber values.

The main goal of this project is to expedite the recovery of grassland habitat. This is facilitated by the participation of CBFWCP biologists on the Trench Restoration Committees and through the funding of grassland restoration opportunities in both the Cranbrook and Invermere Forest Districts. These opportunities are operational in nature and include the development of ***Stand Management Prescriptions*** (SMP), Burn Plans, Pre-Burn Slashing and ***Prescribed Burning***.

It is estimated that 4500 ha of impacted grassland will need to be treated annually to restore grassland and open forest habitat and their dependant wildlife to historical levels within a 30-year horizon. Monitoring and weed control will also be conducted under this project.

I Project Identification

- Participating on the Rocky Mountain Trench Restoration Committees and Radium Bighorn Sheep Working Group to co-ordinate activities among WLAP, BC Forest Service, Kootenay National Park and CBFWCP;
- Developing Stand Management Plans and Burn Plans for 1,500 ha of priority sites as identified by the EK Trench Restoration Committees.

II Project Implementation

- Prescribed burning at Findlay, Central and Echo Pastures in the Invermere Forest District (1,538 ha);
- Slashing at Andy Good Creek (50 ha) and the Newgate area (500 ha) in the Cranbrook FD and Spur Lake (25 ha) in the Invermere FD.

III Project Monitoring and Reporting

- Pre-treatment vegetation monitoring established on Gina Lake Pasture, Hatchery Ridge and Rocks Pasture;
- Map boundaries of enhancement sites using backpack GPS;
- Input data and summarise vegetation monitoring data;
- Complete annual report of enhancement activities.

The goal of prescribed burning is to reduce conifer stocking to restoration targets of 76 – 400 stems per hectare (sph) in open forests and 0 – 75 sph on open range. The pre-burn slashing is designed to meet conifer stocking targets identified in the SMP and the slash is readied for follow up burning where prescribed. This project is also developing SMP's for the annual treatment of 1,500 ha of impacted grassland on an ongoing basis.

CBFWCP's objective is to contribute at least 25% (1,125 ha) toward the annual goal of restoring 4,500 ha of forest ingrowth to a grassland ecosystem.

This project is improving grassland habitat for a number of grassland-dependant wildlife species, facilitating the eventual re-introduction of Columbian sharp-tailed grouse and providing feedback to CBFWCP about the effectiveness of treatment activities.

Project Duration: Ongoing

Partners: **Rocky Mountain Elk Foundation; Rocky Mountain Natural Resource Society; Ministry of Forests; Habitat Conservation Trust Fund; East Kootenay Wildlife Association; Ministry of Water, Land & Air Protection; Sparwood Fish & Wildlife Association; Tembec Industries; Additional funding by Columbia Basin Trust**

PURCELL MOUNTAIN CARIBOU TRANSPLANT Project **#W02-NM-016**

Project Manager: Bob Forbes, WLAP Section Head (Cranbrook)
Project Biologist: Guy Woods, Wildlife Biologist (Nelson)
Contract Biologist: Trevor Kinley, Sylvan Consulting (Invermere)

The Purcell Mountains south of the Purcell Wilderness Conservancy historically supported a ***mountain caribou*** population of 100 or more animals. The population has declined rapidly during the past decade and the last census, completed in 2000, located only 18 caribou. Recent caribou sightings in this area indicate that the population has not yet been extirpated. However, a population this low is vulnerable to random events that could easily lead to ***extirpation***.

The Purcell mountain caribou population has declined as a result of pressure from major changes in the area. Caribou rely on old growth forests for survival including the availability of escape cover for predator avoidance and the continued presence of lichens for winter food.

Logging over the past century has resulted in long term changes in the forests available to these caribou. As less old forest is available, the caribou become more vulnerable to predation and are under additional stress while locating winter food. Cougar and wolf populations in the area have increased dramatically during the past two decades. Cougar are believed to be the predator having the greatest impact on caribou.

Snowmobile use in the area is also contributing to stress on the mountain caribou population as better machines have made it possible for people to get into more and more caribou habitat. Logging road creation has opened access to new areas and now snowmobiles are regularly observed throughout much of the range of this caribou population. Snowmobiles may be causing the caribou to abandon key winter habitats.

The objective of this project is to halt this current decline by transplanting 20 adult caribou from the Ilgachuz Range near Williams Lake in west central British Columbia to the southern Purcells between the St. Mary River and the Goat River. Biologists are consulting with outdoor groups and First Nations communities in the Williams Lake and Purcell Range areas to help ensure the success of the transplant.

After release the caribou will be monitored from the air twice weekly through the spring, summer and autumn to determine mortality and dispersal. In winter the monitoring will change to weekly as they are less vulnerable to mortality. Any observed mortality will be investigated immediately to determine the cause of death.

A careful examination of the success of this planned transplant will help provide direction for the implementation of subsequent recovery actions.

Project Duration: 1 Year

Partners: **Ministry of Water, Land & Air Protection, Kootenay Region; Habitat Conservation Trust Fund; Aquila Networks Canada; Additional funding by Columbia Basin Trust;**

Related reports available @ **www.cbfishwildlife.org:**

LaForme Creek Lichen Enhancement Project: Preliminary Results to Date, February 2001

2002 Population Survey for the South Purcell Subpopulation of Mountain Caribou, April 2002

MT. BROADWOOD HABITAT ENHANCEMENT Project **#W02–NS-212**

Project Biologist: Larry Ingham, Wildlife Biologist (Invermere)

Project Co-ordinator: Dave Hillary

The Mt. Broadwood-Wigwam Flats area is a dry site that contains vegetation important for winter forage for ***blue-listed*** (vulnerable) ***Rocky Mountain big horn sheep***, elk and deer. The area is also valuable summer range for bighorn sheep, elk, deer and grizzly bear. The Elk and Wigwam rivers merge within the Mt. Broadwood area, which increases its significance as an important transition zone for wildlife and exceptional aquatic habitat for blue-listed ***bull trout*** populations as well as west slope cutthroat trout. Gray wolf, cougar and ***wolverine*** as well as numerous bird and small mammal species contribute greatly to the area's biodiversity.

This project is to conduct ***enhancement*** activities on property that includes 8,900 ha donated by Shell Oil and managed by the Nature Conservancy of Canada and 1,200 ha of adjacent land managed by the Ministry of Water, Land & Air Protection.

Specific activities include: locating and eradicating spotted ***knapweed***, diffuse knapweed, hounds tongue, dalmatian toadflax and yellow hawkweed; reducing the encroachment of fir understory on grasslands; and minimizing the impact of human activities on sensitive habitat through public education and compliance with access management plans.

Project Duration: 1 Year

Partners: **Nature Conservancy of Canada; Ministry of Water, Land & Air Protection; Tembec Industries; Ministry of Forests; Fernie Rod & Gun Club; Additional funding by Columbia Basin Trust**

ST. MARY'S RESERVE ECOSYSTEM RESTORATION

Project Biologist: Larry Ingham, Wildlife Biologist (Invermere)

Project Co-ordinator: Brent Lucas

The St. Mary's Indian Reserve contains a 7,500 ha land base in the Rocky Mountain Trench that has been ecologically altered over the past 50 years as a result of forest fire suppression. The in-growth of trees in the open forest and grasslands has degraded the habitat and impacted resident grassland species. An Integrated Resource Management plan completed last year by the St. Mary's Indian Band recommended the application of ***silviculture*** treatments and conducting of ***prescribed burns*** to selected areas of the Reserve to reverse the results of the fire suppression and help ***restore*** the health of the ecosystem.

This project complements a number of other Rocky Mountain Trench grassland restoration initiatives underway designed to recover more grassland habitat annually than is being lost.

Project Duration: 1 Year

Partners: **Ktunaxa Kinbasket Development Corporation; First Nations Forestry Program; St. Mary's Indian Band; Funding by Columbia Basin Trust**

WIGWAM FLATS BIGHORN SHEEP HABITAT RESTORATION

Project Biologists: Larry Ingham, Wildlife Biologist (Invermere)
Irene Teske (Cranbrook)

Project Forester: Denis Petryshen (Cranbrook)

Contract Forester: Mark Hall (Jaffray)

Volunteer Co-ordinators: David Fantuz, Mario Rocca (Fernie)

Low intensity fires historically occurred in the Rocky Mountain Trench every 3 – 25 years. Wigwam Flats is an extremely important winter range for elk, bighorn sheep, ***mule deer*** and white-tailed deer.

The Wigwam Flats ***Ungulate*** Winter Range Habitat Enhancement Project identified 850 ha that require restoration work to offset the in-growth of Douglas fir and lodgepole pine from fire suppression. The comprehensive East Kootenay Bighorn Sheep Habitat & Population Assessment, spearheaded by the East Kootenay Wildlife Association, outlined the prime wintering habitats for the blue-listed Rocky Mountain bighorn sheep in the Wigwam Flats.

The goals of this project are to ***restore*** 146 ha of ingrown habitat by slashing, improve the foraging capacity of habitat to historical levels by removing encroaching conifers, and improve sight-lines for sheep to detect and avoid stalking predators.

These activities are expected to increase the abundance of more desirable forage species such as rough fescue, bluebunch wheatgrass and saskatoon berries. As well, the increase in plant diversity should result in a greater wildlife diversity of ground nesting birds and small mammals that prefer open range and open forests.

An extension of this project is presentations to local schools and community groups to increase public understanding of the importance of ecosystem restoration, the ecology of bighorn sheep and completed enhancement work.

Project Duration: 1 Year

Partners: **Fernie Rod & Gun Club; Ministry of Water, Land & Air Protection; Ministry of Forests; Funding by Columbia Basin Trust**

Related reports available @ **www.cbfishwildlife.org:**

Habitat Selection by Bighorn Ewes on Three Winter Rangers in the East Kootenays, September 2000

CONSERVATION OF BADGERS IN THE EAST KOOTENAYS Project **#W01-NM-008**

Project Biologist: Larry Ingham, Wildlife Biologist (Invermere)

Contract Biologist: Nancy Newhouse, Sylvan Consulting (Invermere)

The East Kootenay Badger Project has been underway since 1996. During this time, 32 badgers have been captured and implanted with radiotransmitters and monitored to track and document home range, habitat use and demographics. Partially as a result of this research, ***American badgers*** in British Columbia have been designated as ***red listed*** (endangered). Almost all of the badgers in the province appear to occur within the East Kootenay and the Cariboo, Thompson-Nicola and Okanagan-Boundary regions, with estimated populations of 100 adult badgers in the East Kootenay and 150 in the other regions combined. Therefore, the provincial population is likely less than 250 adult badgers.

The badger population in the upper Columbia drainage, despite reasonably good habitat conditions and their recent status as a relatively common animal, is fewer than 10 adult badgers with possibly only one resident female. Reasons for this decline are not completely understood. Vehicle collisions have played a role, while shooting and possibly unintentional deaths through consumption of poisoned prey, such as ground squirrels, may also have contributed. At some point during the decline, the population likely reached the lower threshold required for successful breeding, resulting in an accelerated rate of decline. There has been no known successful breeding in the upper Columbia since 1995. Human developments may have impaired movements, and therefore breeding opportunities to some slight degree.

Translocation may bring the population back above the lower threshold for successful breeding and improved public conservation ethics should help to reduce human-caused morality. A habitat suitability model has been developed to assist in the selection of candidate release sites.

Biologists concluded it was more prudent and proactive to augment the population with suitable badgers from similar habitat rather than let the decline continue and the badgers disappear. This would result in an even greater uphill battle of reintroducing an ***extirpated*** population.

This year, the Badger Recovery Team launched an experimental augmentation program with the translocation of seven adult badgers (2 females, 5 males) from a genetically related population in the Kalispell, Montana area to the upper Columbia area.

Biologists implanted the badgers with radio transmitters and released them in vacant, high quality badger habitat; where possible away from the highway that accounts for a high percentage of badger mortalities.

The goal is to translocate 15 badgers from Montana to the most depleted areas in the upper Columbia Valley area. These badgers could 'kick-start' the EK population's recovery by creating or enhancing a core population. It is expected that the recovery project would also provide new genetic material to a group that has very likely undergone inbreeding due to its reduced size.

If the experiment is successful, then the recovery team could look at a similar augmentation program to restore badger populations in the Thompson and Okanagan regions. Biologists are tracking the translocated badgers as well as the 10 remaining radio-collared badgers.

The badger project has received extensive media coverage locally and provincially in conjunction with an intensive public education campaign over the past year.

Two golf courses and 17 private landowners have joined the project to date and are managing their properties for the conservation of badgers and their Columbian ground squirrel food source. In addition, the ongoing acquisition of parcels of the 1896-acre Wycliffe Wildlife Corridor near Cranbrook from Teck Cominco by a Land Conservancy of BC partnership will protect critical badger habitat in perpetuity.

Duration: Year 2 of 3

Partners: **Ministry of Water, Land & Air Protection; Montana Department of Fish, Wildlife & Parks; *jeffersonii* Badger Recovery Team; Canada Parks Service; Invermere Veterinary Hospital; East Kootenay Environmental Society; TEMBEC Forest Industries; Forest Renewal BC; Kimberley Golf Course; Copperpoint Golf Course; Habitat Conservation Trust Fund; Private landowners; Local public**

Related reports available @ **www.cbfishwildlife.org:**

Habitat Associations of American Badgers in Southeast British Columbia, January 2001

The Ecology of Badgers in Southeastern BC, March 2000

Bold and italic text – see Glossary for more information

BASIN-WIDE

NON-GAME SPECIES HABITAT ENHANCEMENT Project# **W00-NL-019**

Project Biologists: John Krebs, Senior Wildlife Biologist (Nelson), Larry Ingham, Wildlife Biologist (Invermere) Doug Adama, Wildlife Biologist (Invermere), Ross Clarke, Wildlife Biologist (Nelson)

Contract Biologist: Mitch Firman (Calgary)

Wildlife Technicians: Thomas Hill, Aaron Reid (Nelson); Andrea Davidson (Invermere)

CBFWCP has developed and implemented small-scale enhancement projects to benefit ***painted turtles***, cavity nesting ducks, wetlands, snakes, ***Townsends Big-eared Bats*** and other bat species. These species, a number of which are vulnerable or endangered, have been affected by hydroelectric developments. Activities have included creation of alternate nest sites for turtles, enhancement of cavity-nesting duck populations through installation of ***nest boxes***, snag creation and construction of a secure maternity roost for Townsends Big-eared Bats.

This project is responsible for the development, implementation, monitoring and maintenance of these ***enhancement*** initiatives. Specific activities include:

- Monitor and maintain nestboxes in Columbia Valley and Meadow Creek area;
- Control vegetation on alternate nest sites created for turtles near Argenta, Revelstoke and Cranbrook;
- Monitor the use of alternate nest sites created for turtles at Elizabeth Lake, Revelstoke and Argenta;
- Monitor and maintain maternity roosts of the red-listed Townsends Big-eared Bat near Cranbrook, including liaison with First Nations and resort developers at the St Eugene Mission;
- Literature review to incorporate specific habitat objectives and targets into East Kootenay Trench Ecosystem Restoration prescriptions;
- Identify abandoned mine works used by bats adjacent to Kootenay Lake in order to recommend appropriate conservation measures;
- Identify and implement wetland enhancement opportunities in the West Kootenay;
- Conduct an inventory of the ***blue-listed*** racer snake in the Pend d'Oreille;
- Resurvey bat roost trees in the Pend d'Oreille.

Results anticipated from these activities include: minimizing road mortality of nesting blue-listed painted turtles; and maintaining the viability of the St Eugene Mission maternity roost site for Townsends Big-eared Bats.

A number of future habitat management activities are necessary on a long-term basis to maintain/enhance wildlife populations. These include:

- Conservation and preservation of identified bat roosting colonies and ***hibernacula***;
- Maintenance and preservation of known Townsend's Big-eared Bat maternity colonies;
- Continuing to investigate wildlife tree creation opportunities in conjunction with Rocky Mountain Trench Ecosystem Restoration initiatives; and
- Enhancement of small ***wetlands***.

Overall, this project will benefit non-game species by conserving ecologically important and vulnerable bat species, developing a protocol for assessing bat use of mine adits, improving nesting success of cavity nesting ducks, increasing wildlife viewing and hunting opportunities, improving the viability of local painted turtle populations and reversing the loss of ecologically important wetlands.

Project Duration: Ongoing

Partners: **Ktunaxa Kinbasket Tribal Council; Delta Hotels; Rocky Mountain Naturalists; Golden & District Rod & Gun Club; Windermere Rod & Gun Club; City of Cranbrook; City of Revelstoke; Ministry of Transportation; Revelstoke Arrow Heights Elementary School; North Arm Wildlife Club; Nelson Naturalists; VSA Highways Maintenance; BC Hydro**

Related reports available @ **www.cbfishwildlife.org:**

Summary Report: Painted Turtle Nest Site Enhancement and Monitoring at Elizabeth Lake, Cranbrook BC, October 2001

Summary Report: Painted Turtle Nest Site Enhancement and Monitoring at Red Devil Hill, October 2000

A Summary of Bat Research in the Pend d'Oreille Valley in Southern British Columbia, December 2000

Identifying Critical Habitats for a Vulnerable Snake Species, the Rubber Boa, July 1999

Habitat use and movement patterns of Northern Alligator Lizards and Western Skinks in Southeastern British Columbia, January 2001

Distribution and Status of herpetofauna in the Columbia Basin, April 1996

LARGE MAMMAL MONITORING W95-L-012

Project Biologists: Larry Ingham, Wildlife Biologist (Invermere)
John Gwilliam, Wildlife Biologist (Nelson)

The Large Mammal Monitoring Plan (LMMP) was developed in 1998 to address the need for population trend data basin-wide for seven species of ***ungulates***: mule deer, white-tailed deer, caribou, ***moose***, bighorn sheep, elk and mountain goat.

In 2001 – 02 the LMMP recommended absolute abundance surveys for mountain goats in the East and West Kootenays. However, due to the prevalence of unsatisfactory weather conditions during the late summer of 2001, a few management units were not completed. Management Units missed to date will be captured during this project year.

For 2002 – 03 an absolute abundance survey of selected areas is scheduled for moose in the East Kootenays study area. Concentrations of wintering populations considered for inventory include:

- Donald Block within Wildlife Management Unit 4–36;
- Teepee Creek Block within Wildlife Management Unit 4–03;
- Bull River Block within Wildlife Management Unit 4–22;
- St. Mary's Block within Wildlife Management Unit 4–20

Carry over counts for deer will also occur in the East Kootenays. Counts involve local rod and gun club participation. Previously identified transects will be counted at least 4 times each spring. Spotlight counts will continue in the West Kootenays' Pend d' Oreille Valley as well as the monitoring of radio-collared mule deer and white-tailed deer in the south Salmo – Creston area to provide feedback on caribou/mule deer recovery initiatives.

The results of these monitoring activities are incorporated in restoration/enhancement plans, habitat and population management plans and South Selkirk ***mountain caribou*** recovery plans.

The data will also be used to monitor animal response to enhancement or protection activities where possible, estimate pre-enhancement populations, assist in developing detailed enhancement projects and track the status of ungulate species.

This project is helping identify areas of high use to aid in long-term plan development, assisting in evaluating the success of the enhancement or protection activities and improving the ability to identify a trend in populations before it becomes a serious problem.

Project Duration: Ongoing

Partners: **East Kootenay Wildlife Association; Canal Flats Wilderness Club; Kimberley Wildlife & Wilderness Club; Fernie Rod & Gun Club; Lake Windermere Rod & Gun Club; Traditional Bow Hunters of BC; Sparwood Fish & Wildlife Association; Ministry of Water, Land & Air Protection; Ministry of Forests**

Related reports available @ **www.cbfishwildlife.org:**

2002 Southern East Kootenay Mountain Goat Aerial Survey, January 2001
Winter Habitat Selection by White-tailed Deer in the Pend d'Oreille Valley, September 2000
Cougar Predation and Population Growth of Sympatric Mule Deer and White-tailed Deer, April 2002
Movements, Survival and Mortality of White-tailed Deer in the Pend d'Oreille River Valley, December 2002

GREAT BLUE HERON BREEDING INVENTORY & HABITAT ASSESSMENT Project# W02-NS-202

Project Biologist: John Krebs, Senior Wildlife Biologist (Nelson)

Contract Biologist: Marlene Machmer, Pandion Ecological Research (Nelson)

The Great Blue Heron is a vulnerable (***blue-listed***) species with stable to declining populations in British Columbia. Most of B.C.'s human population lives within the bird's natural habitat on the coast and in the Southern Interior. Herons and their habitat in the Columbia Basin have been impacted by a variety of human activities including extensive land development, general human disturbances and the construction of some dams.

This interior subspecies nests in small to large breeding colonies along the margins of lakes, slow-moving rivers, ***wetlands*** and sloughs. The heron typically breed and roost in mature black cottonwood or coniferous stands on lake islands, in wooded swamps and other isolated locations near shallow water foraging habitat.

The primary food source for herons is fish. They also stalk upland fields for small mammals, especially in winter when some of the birds remain around ice-free watercourses instead of migrating south.

Herons are extremely sensitive to human disturbance, particularly during the early stages of nest selection, nest

building, pair formation and egg laying. While some colonies habituate to non-threatening disturbance, colony abandonment as a result of nearby human activity has been widely documented.

Heron populations in the Columbia Basin appear to be holding their own, but exactly how many there are in the region is unknown. The last comprehensive survey of herons in the Columbia Basin occurred in the early 1980's which documented 19 breeding colony sites.

The goals of this project are to: identify active heron breeding sites throughout the basin; conduct a public awareness campaign to solicit information on heron breeding locations; reduce human disturbance incidents while promoting local stewardship, habitat protection and enhancement/restoration efforts; and obtain good baseline data to use as a benchmark in measuring the effects of future disturbances to herons and their habitat. This project will also provide vital information on heron breading habitat distribution to assist land management agencies in making habitat protection and enhancement decisions.

Project Duration: 1 Year

Partners: **West Kootenay Naturalists; Local Public**

Related reports available @ **www.cbfishwildlife.org:**

Final Report due January 2003

CBFWCP LAND ACQUISITION Project# **W95-L-021**

Project Biologists: John Krebs, Senior Wildlife Biologist (Nelson)
Larry Ingham, Wildlife Biologist (Invermere)
John Gwilliam, Wildlife Biologist (Nelson)

Land acquisition is an effective means to ensure key parcels of wildlife habitat are protected from non-compatible uses. The CBFWCP Land Acquisition Strategy provides direction to assist in prioritising potential purchases based on their value to the fish & wildlife resource. Land recommended for purchase will depend on availability, priority ranking and cost. Ranking criteria include: habitat at risk; protecting critical habitat for species at risk; winter range capability; potential of a habitat to be ***enhanced*** and made more productive for affected species; proximity to other habitat reserves and to valuable habitats affected by hydroelectric developments; potential for partnerships to get the highest value for CBFWCP's land acquisition budget; and cost of ongoing management requirements to maintain and enhance the habitat.

CBFWCP works closely with Ministry of Water, Land & Air Protection's Land Management staff throughout the process to ensure there is co-ordination with other land acquisition initiatives. A detailed proposal outlining the parcels being considered is submitted separately for Steering Committee consideration. Final approval for the purchase of any property will be sought from the Technical and Steering Committees prior to purchase negotiations. Depending on the nature of the parcel purchased, management and/or enhancement activities may also be required in the future. These activities are delivered within the CBFWCP Land Management Operations.

To date, CBFWCP and partners have acquired and are managing nearly 3,500 ha of important habitat throughout the basin.

This year, Program staff is focussing on establishing partnerships with land stewardship groups or non-government organizations to participate in ***conservation*** covenants/easements development on key private lands. The goal is to formalize working relationships whereby CBFWCP could provide financial assistance and technical resources to land stewardship groups with related goals and objectives. The groups would be encouraged to apply for assistance on a case-by-case basis.

CBFWCP has also entered into a partnership with the East Kootenay Conservation Program, which is made up of more than 25 groups and agencies involved in habitat conservation in the region. The EKCP is a locally-based collaborative initiative working to facilitate a win-win approach to ecosystem conservation on private and connected Crown lands to maintain the rich biological, economic, and social heritage of the East Kootenay. EKCP partners currently manage 17,630 hectares of private and Crown lands between Golden and Fernie. This partnership involvement is expected to greatly enhance CBFWCP's ability to leverage funds for both acquisition and stewardship.

Another goal for this year is to acquire one of the top 10 priority properties identified in the Columbia Basin.

This project benefits fish and wildlife populations by protecting key wildlife habitats from incompatible land uses and fostering long-term commitment to conservation and enhancement in the Program's Columbia Basin area.

Project Duration: Ongoing

Partners: **Columbia Basin Trust; The Land Conservancy; Rocky Mountain Elk Foundation; BC Conservation Foundation; The Nature Trust of BC; Ministry of Water, Land & Air Protection; Elk Valley Clubs; East Kootenay Conservation Program**

CBFWCP LAND MANAGEMENT OPERATIONS Project# **W95-L-009**

Project Biologists: John Gwilliam, Wildlife Biologist (Nelson)
Larry Ingham, Wildlife Biologist (Invermere)
Ross Clarke, Wildlife Biologist (Nelson)

Wildlife Technicians: Thomas Hill, Aaron Reid (Nelson)
Nicole Thomas, Shane Dennis (Pend d'Oreille)

CBFWCP manages approximately 3,500 ha in the vicinity of the Arrow Lakes, Pend d'Oreille River, Kootenay Lake and Columbia Lake. The Program also participates in management activities on Big Ranch/Musil properties in the Elk valley. Detailed habitat management plans direct enhancement activities on the CBFWCP/WLAP properties in the Pend d'Oreille valley, near Arrow Lakes, Nelson, Meadow Creek and the Elk Valley. However, the Pend d'Oreille Wildlife Management and Compartmentalized Habitat Enhancement Plans, developed in the 1980's and focussed on white-tailed deer management, are somewhat dated and need revision to encompass all wildlife species.

CBFWCP staff is also addressing land management issues ranging from illegal public use to weed control and habitat enhancement. Other specific tasks include: continuing Pend d'Oreille weed control; controlling Coleman Ranch spotted ***knapweed***; haying and thistle mowing at Meadow Creek; and managing roads and fences.

Anticipated results include the completion of management plans for all CBFWCP/WLAP/TNT properties by 2003/04, a year-to-year decrease in weed distribution and abundance, clarification on a management approach on early successional field habitat in Meadow Creek and the implementation of a Big Ranch/Musil Property Management Plan in the Elk Valley.

This project is assisting CBFWCP staff to continuously improve important habitat, quickly respond to land management issues as they arise and identify future habitat enhancement activities.

Project Duration: Ongoing

Partners: **Habitat Conservation Trust Fund; Ministry of Water, Land & Air Protection; The Nature Trust; Elkford Rod & Gun Club; Fernie & District Rod & Gun Club; Sparwood Fish & Wildlife Association**

Related reports available @ **www.cbfishwildlife.org:**

Archaeological Impact Assessment – Deer Park and Broadwater Wildlife Properties on Lower Arrow Lake, October 2002

COLUMBIA BASIN BIODIVERSITY ATLAS Project# **W00-NM-011**

Project Co-ordinator: Ian Parfitt, GIS Co-ordinator (Nelson)

A ***Biodiversity*** Atlas for the Columbia Basin is envisioned as a means of graphically presenting information about resident species and their habitats, using a combination of maps, text and photos, to assist the research community, resource managers and the public.

The Columbia Basin is a very biologically diverse ecosystem. For example, 67% of vertebrate species in BC and 48% of total vertebrate species in Canada live in the region. Making the habitat needs of wildlife visible and understandable through an atlas can enable the public, policy makers and resource managers to better understand species and ecosystems at risk and how human activities may impact or help to conserve them. An atlas can also show what information is available and where information gaps exist.

This project will help meet CBFWCP's mandates of sustaining and enhancing fish and wildlife populations impacted by BC Hydro dams and sharing information with the public to raise understanding and support for the conservation needs of these species. The goal of this project is to tell the story of the ecosystems and wildlife of the basin through maps and reports gleaned directly from the most up-to-date information available.

Last year, the purpose and parameters of the proposed atlas was developed by a working group of over 40 cross-boundary government, private and First Nations participants. The group supported the development of a seamless biodiversity atlas for the entire 67 million-hectare B.C.-U.S. Columbia Basin.

The goals this year are to launch a website-based pilot atlas project and establish partnership agreements for data sharing, hosting and development costs. This project will also begin supporting key CBFWCP initiatives, such as the Rocky Mountain Trench Grassland Restoration, with spatial data generated by the pilot atlas.

Key partnerships are being formed with the Ministry of Sustainable Resource Management and Selkirk College's GIS program, which recently received Centre of Excellence funding from the Federal Government.

Future activities will include extending the pilot atlas to include all available data in the region and expanding the geographic scope beyond the pilot areas to the Compensation Program area and, with partner support, to the basin at large.

Completion of an atlas for the entire B.C.-U.S. Basin will require partnerships with many agencies as only 7.7 million ha of the Columbia Basin falls within the Compensation Program area.
As well as assisting in the ***conservation*** of listed and important wildlife species and habitats, this project can be used as an educational tool to inform the public on species requirements and important wildlife habitats, describe habitat improvement opportunities to the public (ie. bat houses, ***nest boxes***, stewardship programs), outline both current and required conservation initiatives, and
provide resource managers with a synthesised tool for resource management.
Duration: Year 2 of 3
Partners: **University of British Columbia; Ministry of Sustainable Resource Management; Ministry of Water, Land & Air Protection; Selkirk College**
Related reports available @ **www.cbfishwildlife.org:**
Columbia Basin Biodiversity Atlas: Phase One, June 2001

PROJECT INFORMATION AND EXTENSION Project # **W01-NL-021**

Project Biologists: John Gwilliam, Wildlife Biologist (Nelson)
Larry Ingham, Wildlife Biologist (Invermere)
Ross Clarke, Wildlife Biologist (Nelson)

The CBFWCP Wildlife program is experiencing an increased demand for project information from resource managers, government and non-government agencies as well as the public and media within and outside the region. At least six large, multi-year research/inventory projects are developing final reports over the next year. The purpose of this project is to ensure project findings and recommendations are effectively communicated for consideration. Information extension includes taking final reports and formatting to submit to peer reviewed journals, posting reports on the CBFWCP website, making presentations at relevant workshops and conferences, meeting with WLAP and other agency personnel regarding project findings and potential actions. These technically-focussed activities will complement the Compensation Program's public communications mandate. Specific activities include: journal papers to be submitted on the ***northern leopard frog*** project, ***wolverine*** study, harlequin duck project and ***mule deer*** study.
This year's goal is to submit four papers to peer-reviewed journals. This initiative is a
cost-effective means of ensuring project information is considered by resource managers and should help maintain active interaction among the Program, its partners and agencies
Duration: Ongoing
Partners: **Ministry of Water, Land & Air Protection**

SMALL WILDLIFE PROJECTS Project # **W95-L-013**

Project Biologist: John Krebs, Senior Wildlife Biologist (Nelson)

Providing opportunities for public involvement in meaningful projects to enhance wildlife populations in the Columbia Basin is a cornerstone of the Compensation Program. This task addresses the need for increased club or organization participation with the Compensation Program. Clubs are invited to approach the Program for technical and small financial assistance in club-initiated projects anytime within CBFWCP's project year. The funding available for each community-initiated wildlife project in this Small Works Project is up to $10,000 per project.
Recent small works projects include ***restoring*** McGinty Lake ***wetland*** habitat by raising the water levels using a pump system to deliver water from Cherry Creek in partnership with the Kimberley Wildlife & Wilderness Club; and ***enhancing*** mule deer habitat in the New Denver/Silverton area in partnership with the New Denver Friends for Wildlife.
This project enables clubs to play an active role in the enhancement of wildlife habitat, provides volunteers with technical expertise and the necessary funds for equipment and material, and increases public awareness of CBFWCP.
Project Duration: Ongoing
Partners: **Local Community Groups**
Related reports available @ **www.cbfishwildlife.org:**
Small Works Project Application
McGinty Lake Enhancement Report, June 2002

Small wildlife projects for this year include:

WANETA WINTER RANGE RESTORATION

Project Biologist: John Gwilliam, Wildlife Biologist (Nelson)

Contract Biologist: Lee Schaeffer (Castlegar)

Volunteer Co-ordinators: Richard Fillmore, David Pasin, Rob Frew (Trail)

Historically, the south facing slopes of the Waneta Highlands provided prime winter habitat for ungulates including deer and elk. Fire is not an option here to rejuvenate habitat because of the close proximity to private property and sensitive soils.

The goal of this project is to rejuvenate the site productivity and habitat quality. Manual brushing will be used to encourage decadent browse species like redstem ceanothus, Douglas maple, saskatoon and other species to resprout.

Douglas-fir seedlings will be planted in clumps over the site to gradually improve snow interception and increase the natural ***biodiversity*** of the habitat.

An additional benefit could be a reduction in wildlife-vehicle collisions and subsequent ungulate mortalities that frequently occur on Highway 3B below the treatment site.

Project Duration: 1 Year

Partners: **Trail Wildlife Association; J.L Crowe Secondary School; West Kootenay Archers; Atco Lumber Company; Ministry of Forests; Funding by Columbia Basin Trust**

REVELSTOKE CARIBOU/SNOWMOBILE MANAGEMENT

Project Biologists: John Krebs, Senior Wildlife Biologist (Nelson)
Bob Brade, Habitat Biologist (Revelstoke)

Project Technician: Dave Lewis

Volunteer Co-ordinators: Tom Dickson; Ron Laroy

Frisby Ridge, Sale Mountain, Keystone/Standard Peak and Caribou Basin in the Selkirk and Monashee ranges north of Revelstoke are home to an estimated 350 – 400 ***red-listed*** mountain caribou. The decline in ***mountain caribou*** populations is attributed to a variety of human activities including disturbance by snowmobiles.

The Revelstoke Snowmobile Club initiated this project to separate snowmobilers from habitats where they could disturb caribou. While an agreement is in place on when and where snowmobiling will occur on the identified mountains, the terrain and inherent winter weather conditions can prove difficult for many snowmobilers to translate a map-based description of closures to the mountain slopes where they are travelling.

Project activities include the production and installation of direction/information signs in appropriate locations at each of the four areas, information brochures and patrols of the sensitive areas. The goal is to keep snowmobilers oriented and avoid mistakes that could further impact this endangered mountain caribou herd.

Project Duration: 1 Year

Partners: **Revelstoke Snowmobile Club; Ministry of Water, Land & Air Protection; Ministry of Sustainable Resource Management; Funding by Columbia Basin Trust**

DIONE COPPER BUTTERFLY ASSESSMENT

Project Biologist: John Krebs, Wildlife Biologist (Invermere)

Contract Biologist: Norbert Kondla (Genelle)

Volunteer Co-ordinator: Art Gruenig, Dean Nicholson (Cranbrook)

The Dione Copper butterfly is widespread on the Great Plains of North America but is restricted to local populations in the mountainous environments of the west. In BC, there was no known sightings of the Dione butterfly until a small population was discovered at a site near Cranbrook's Elizabeth Lake in 1989 and a second site in the Bar Creek area in 2001.

Based on these sightings, the Committee on the Status of Endangered Wildlife in Canada has commissioned a formal status report on this ***red-listed*** butterfly species to identify additional sites and the general condition of their habitat for future protection and rehabilitation work.

Bold and italic text – see Glossary for more information

CBFWCP and the Columbia Basin Trust are capitalizing on this opportunity by contributing additional funding to increase the extent of field surveys for a more comprehensive assessment. CBFWCP is involved to determine if BC Hydro dams and reservoirs are a factor in the decline of Dione butterfly populations in the Columbia Basin.
The assessment area encompasses the Creston area and the Rocky Mountain Trench from the USA border to the Golden area. These are areas that may support previously unknown populations of Dione butterflies, which are primarily associated with ***wetlands***.
Project Duration: 1 Year
Partners: **Rocky Mountain Naturalists; Funding by Columbia Basin Trust; Committee on the Status of Endangered Wildlife in Canada**
Related reports available @ **www.cbfishwildlife.org:**
Field Surveys for the Dione Copper Butterfly, September 2002

EAST KOOTENAY CONSERVATION YOUTH TEAM WILDLIFE HABITAT PROTECTION
Project Biologist: Larry Ingham, Wildlife Biologist (Invermere)
Contract Biologist: Ian Radridge
Project Co-ordinators: Gary Tipper; Jim Hope
This project is augmenting the funding for a youth team to carry out habitat protection and enhancement activities on 11 Nature Trust properties, two Wildlife Management Areas and seven other habitat properties managed by WLAP along the Rocky Mountain Trench and the Elk Valley.
The goal is to protect and ***enhance*** properties with high ***ungulate*** capability and critical migratory bird habitat that are at increasing risk from uncontrolled public access and livestock trespass.
The youth team is controlling noxious weeds through hand treatment as identified in management plans, installing and maintaining fencing to limit public access and trespass by domestic livestock, and installing signs to control public access.
Project Duration: 1 Year
Partners: **The Nature Trust of BC; Ministry of Water, Land & Air Protection; Funding by Columbia Basin Trust**

COWS AND FISH RIPARIAN/RANGE STEWARDSHIP WORKSHOP
Project Biologist: Larry Ingham, Wildlife Biologist (Invermere)
Project Co-ordinators: Meredith Hamstead
Cows and Fish is an established program in Western Canada to promote the understanding and appreciation of ***riparian*** areas for landowners, resource managers and the general public.
The primary goal of this educational workshop is to teach agricultural landowners and the general public in the Upper Columbia Valley area about the ecological and economic values of riparian areas. Targeted groups include the public, ranching and farming landowners, and municipal governments. Participants are provided with stewardship tools to help assess and manage the health of riparian areas on both private and public lands. The riparian assessment method used in the workshop is designed to allow individuals to effectively self-manage their properties to maintain and enhance their riparian areas.
This project is one component of a long-term regional strategy toward progressive landscape-level conservation and ecological management.
Project Duration: 1 Year
Partners: **Columbia River Greenways Alliance; Columbia Kootenay Fisheries Renewal Partnership; Farmer's Institute; District of Invermere; Zehnder Family Farm; Cows and Fish Riparian Habitat Management Program; Columbia Basin Trust**
Related reports available @ **www.cbfishwildlife.org:**
Summary Report: Cows and Fish Workshops, June 2002

SKATTEBO SLASHING

Project Biologist: Ross Clarke, Wildlife Biologist (Nelson)

Project Co-ordinator: Angus Graeme

The Department of Renewable Resources at Selkirk College manages approximately 285 ha of land adjacent to the the Kootenay River near Glade. The property is managed primarily for wildlife habitat, education, and recreation. The objectives of this project includes: 1) ***enhancement*** of 10 ha of late winter and spring ***ungulte*** winter range adjacent to the Kootenay River using a thinning and slash piling treatment; 2) the identification, protection through signage, and recruitment of critical wildlife trees; and 3) signage describing enhancement activities. The project also provides hands-on learning experience for students enrolled in the Renewable Resource programs at Selkirk College.

Project Duration: 1 Year

Partners: **Selkirk College Forestry Program; Aquila Networks Canada**

Related reports available @ **www.cbfishwildlife.org:**

Skattebo Habitat Enhancement – Interm Project Report, November 2001

Evolution of Columbia Basin Fish & Wildlife Compensation Program

Hydroelectric development by BC Hydro in the Columbia Basin occurred between 1960 and 1985. Some of the potential dam impacts were immediately evident, such as the Seven Mile Dam development flooding prime white-tailed deer habitat in the Pend d'Oreille Valley. Other impacts, such as decline in lake productivity, were gradual and took up to a 20 – 25 year period before becoming evident.

The Columbia Basin Fish & Wildlife Compensation Program is a joint initiative separate from—but not independent of—BC Hydro and the Government of British Columbia (Ministry of Water, Land & Air Protection, BC Fisheries) partners. CBFWCP was created in 1994, evolving from existing Mica, Revelstoke and Pend d'Oreille compensation programs as well as related activities in the Arrow and Duncan reservoir areas. The new Compensation Program formed a more comprehensive and integrated program for the BC portion of the Columbia River Basin.

CBFWCP's mandate is to deliver projects to conserve and enhance fish and wildlife populations affected by BC Hydro dam-related activities throughout the Columbia Basin. CBFWCP receives $3.2 million a year from a perpetual fund established by BC Hydro as part of the crown corporation's water licence agreement. The annual allocation of these funds for fish and wildlife projects is established through a three-tiered process:

- project applications are submitted by organizations and community groups;
- Program biologists and respective Fish or Wildlife Technical Committees evaluate proposed projects based on established Acceptability and Ranking Criteria; and
- the technically-approved projects are reviewed and receive financial approval from the CBFWCP Steering Committee.

The Steering Committee, which also approves CBFWCP's Annual Operating Plan, is comprised of representatives from BC Hydro, MWLAP as well as public representatives for each of three areas (southeast Kootenays, southwest Kootenays, northern Kootenays) and First Nations.

A key component of CBFWCP's mandate is Public Consultation and Communications to build support and involvement in the Program among residents, community groups and other key stakeholders including First Nations, local governments, resource users, government agencies and the media.

1994	CBFWCP created
1995/96	CBFWCP begins operations, jump-started by projects underway from previous compensation programs and activities.
1996/97	77 fish & wildlife projects with 30 partners
1997/98	70 fish and wildlife projects with 50 partners 16 projects involving species at risk
1998/99	90 fish and wildlife projects with 90 partners (43 local community groups) 23 projects involving species at risk
1999/2000	44 fish and wildlife projects with 46 partners 15 projects involving species at risk
2000/2001	59 fish and wildlife projects with 123 partners 16 projects involving species at risk
2001/2002	42 fish and wildlife projects with 96 partners 18 projects involving species at risk
2002/2003	47 fish and wildlife projects with 201 partners 24 projects involving species at risk

Approved Projects 2002/2003

● WILDLIFE PROGRAM

Map# Project

Arrow Lakes Valley
1 West Kootenay Ungulate Habitat Enhancement
2 South Selkirk Cougar Ecology & Predation

Kootenay Lake
3 Northern Leopard Frog Recovery

Revelstoke/Big Bend
4 Wolverine Reproduction and Survival

Upper Kootenay
5 East Kootenay Enhancement
6 Purcell Mountain Caribou Transplant
7 Mt. Broadwood Habitat Enhancement
8 St. Mary's Reserve Ecosystem Restoration
9 Wigwam Flats Bighorn Sheep Habitat Restoration

Columbia Valley
10 Conservation of Badgers in the East Kootenays

Basin-Wide
11 Non-Game Species Habitat Enhancement
12 Large Mammal Monitoring
13 Great Blue Heron Breeding Inventory & Habitat Assessment
14 CBFWCP Land Acquisition
15 CBFWCP Land Management Operations
16 East Kootenay Biodiversity Atlas

Small Wildlife Projects

Arrow Lakes Valley
17 Waneta Winter Range Restoration
18 Skattebo Slashing

Revelstoke/Big Bend
19 Revelstoke Caribou/Snowmobile Management

Upper Kootenay
20 Diane Copper Butterfly Assessment
21 East Kootenay Conservation Youth Team Wildlife Habitat Protection
22 Cows and Fish Riparian/Range Stewardship

▲ FISH PROGRAM

Map# Project

Arrow Lakes Reservoir
1 Hill Creek Spawning Channel Operations
2 Arrow Lakes Reservoir Experimental Fertilization Project
3 Hill Creek White Sturgeon Hatchery Pilot Project

Revelstoke
4 Lake Revelstoke Bull Trout Radio Telemetry

Kootenay Lake
5 Meadow Creek Spawning Channel
6 Kootenay Lake Fertilization & Adaptive Management

Basin-Wide
7 Kokanee Spawner Surveys

Small Works Projects

Lower Columbia/Kootenay Drainage
8 Salmo River Telemetry Study
9 Norns Creek Habitat Rehabilitation Monitoring
10 Deer Creek Restoration
11 China Creek Habitat Inventory
12 Murphy Creek Side Channel Spawner Counts & Intake Monitoring
13 Blueberry Creek Barrier Evaluation & Mitigation
14 Lower Columbia Rainbow Trout Studies
15 Sproule Creek Culvert Passage & Rehabilitation
16 Slocan River Temperature Monitoring
17 Lower Lardeau & Duncan Rivers Rainbow Trout Habitat Restoration Assessment

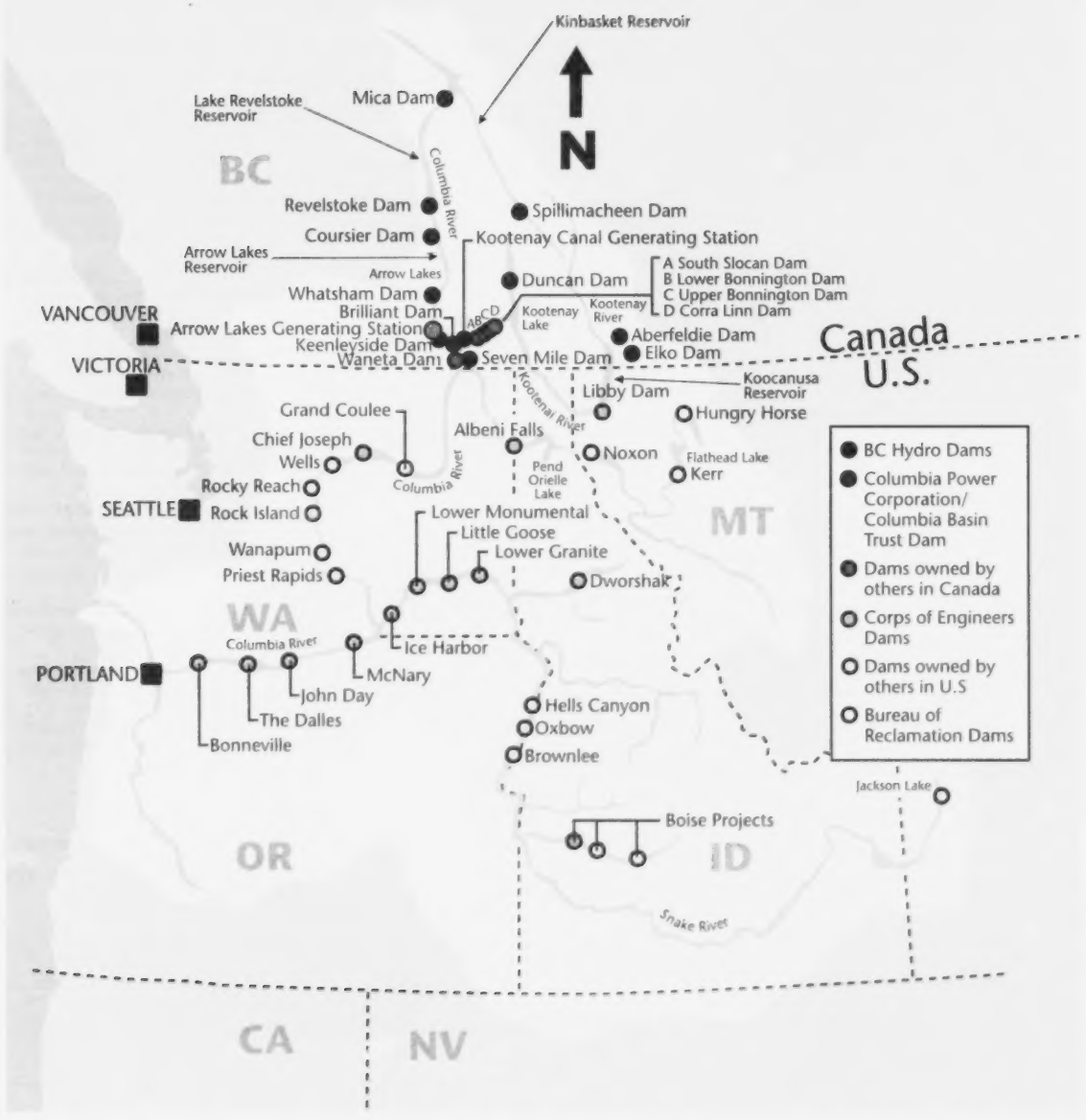
Upper Kootenay
18 East Kootenay Trout Habitat Rehabilitation
19 Columbia Lake Burbot Population Estimate & Juvenile Densities
20 Kinbasket Tributary Fish Passage Improvement

Upper Columbia
21 Fish Derby Monitoring

NOTES

Fish & Wildlife Project Map

Columbia River Drainage System



Key Facts & Events

Geographic	Columbia Basin	87,250 km2	(8.7% of BC; over 2x size of Vancouver Island)	
	Arrow Lakes Reservoir	507 km2	190 km long	52,600 hectares
	Kootenay Lake	405 km2	107 km long	45,187 hectares

1934 Grand Coulee Dam is constructed in Washington State to control floods and produce electricity. Stops anadromous runs of sockeye and chinook salmon and steelhead trout in the Columbia Basin, primarily in Arrow Lakes and Upper Columbia River near Invermere.

1948 Spring floods devastate houses, businesses and communities along the Columbia River in Canada and the US claiming 41 lives, leaving 38,000 people homeless. A US/Canada International Joint Commission begins study of the basin for possible sites for flood control storage projects. The Commission identified areas of storage within Canada to control future flooding situations.

1949 Mysid shrimp is introduced in Kootenay Lake as a food source for intermediate-sized rainbow trout.

1953 Cominco phosphate fertilizer plant on St. Mary river, a tributary Kootenay River is operational and causes a significant decline in water quality and an increase in nutrient levels in Kootenay Lake.

1961 Canadian and US governments sign Columbia River Treaty, requiring Canada to build large dams and storage reservoirs now called: Mica, Keenleyside and Duncan. Canadian government transfers the Canadian portion of the treaty to BC government. US is allowed to build Libby Dam in Montana and flood land upstream in Canada (Koocanusa Reservoir).

1962 The Government of British Columbia creates BC Hydro as the "Columbia River Treaty Entity" responsible for building and operating dams and reservoirs for flood control and power production.

1964 Columbia River Treaty is ratified with the Government of British Columbia allowed to sell a 50% share of down stream benefits for 30 years to build Columbia River Treaty dams and reservoirs.

1967 Duncan Dam is constructed above Kootenay Lake and creates a 7,145 hectare Duncan Lake reservoir.

1968 Fisheries managers introduce Mysid shrimp into Arrow Lakes Reservoir as a food source for young fish-eating trout.

1969 Keenleyside Dam is constructed, flooding the two lakes to create one reservoir of water and eliminating an estimated 30% of spawning/rearing habitat.

1972 Libby Dam is constructed, affecting both fish and wildlife habitat. Nutrient retention in Kootenay Lake (phosphorus loading) declines to one-third of historical levels following pollution control measures at Cominco's fertilizer plant.

1975 Cominco fertilizer plant upgrade on St. Mary River significantly reduces discharge into Kootenay Lake.

1976 Mica Dam is constructed and begins operations with a further impact on fishing stocks. Seven Mile Dam is constructed on Pend d'Oreille River, impacting ungulate habitat. Mica and Pend d'Oreille compensation programs are created by BC Hydro to compensate for fish and wildlife impacts by the dams.

1977 Number of spawning kokanee returning to spawn in North Arm of Kootenay Lake is estimated at 1.4 million.

1980 Hill Creek Spawning Channel is completed by BC Hydro to compensate for impact of Keenleyside Dam on fish populations. The channel is 3.2 km long, 6.1 km wide with 56 settling-basin holding areas for spawners and a capacity for 150,000 kokanee salmon.

1982 Hill Creek Hatchery is completed by BC Hydro to replace anticipated loss of Arrow Lakes fish spawning capacity as a result of Revelstoke Dam.

1984 Revelstoke Dam is constructed, flooding 150 km of mainstem Columbia River and 200 km of tributaries, and significantly impacting fish stocks and habitat over a 11,560 hectare area. Cumulative impact of dams was the estimated loss of 66% of the bull trout population.

1987 Hill Creek Hatchery size is doubled to produce Arrow Lakes fish lost as a result of the Keenleyside Dam. Capacity is 100,000 fingerling bull trout, 20,000 yearling rainbow trout, 60,000 yearling Gerrard rainbow trout and up to 2 million kokanee eggs per year.

1987 Cominco fertilizer plant ceases operation permanently.

1990 Kootenay Lake South Arm kokanee stocks are virtually extinct. MWLAP, Kootenay Region Fisheries holds public meetings to explore restoration options.

1991 Kootenay Lake North Arm spawning kokanee escapement declines to 237,000.

1992 MWLAP and BC Hydro begins 5-year experimental fertilization project in the North Arm of Kootenay Lake.

1994/95 CBFWCP is created which consolidates all previous compensation programs. The Program begins delivering projects to sustain and enhance fish and wildlife populations affected by BC Hydro dam-related activities in the Columbia Basin. Funding is $3.2 million in perpetuity from BC Hydro as a part of the crown corporation's water licence agreement.

1996 CBFWCP begins accelerated projects to measure the effect of the dams on nutrient levels and fish populations in the Arrow Lakes Reservoir.

1996/97 Water levels similar to 1948 occurs along the Columbia River, but flood control from dams reduces natural flows 40% and minimizes impact. No lives or dwellings are lost.

1997 Kootenay Lake North Arm spawning escapement increases to 1.45 million. Amount of fertilizer (agricultural-grade nitrogen & phosphorus mix) is reduced after ongoing monitoring indicates the lake is beginning to retain nutrients from previous fertilizations.

1998 North Arm spawning escapement increases to 2.15 million; total kokanee population in the Kootenay Lake reaches 25 – 30 million; kokanee-feeding bull trout and rainbow trout caught by anglers nearing 13.6 kg (30 lb). The number of Gerrard rainbow trout spawners increases to historical levels.
Kootenay Lake Experimental Fertilization Project results and proposed restoration plan for Arrow Reservoir are presented at 2-day Public Conference in Nelson.

1999 Upper Arrow Lakes Reservoir fertilization from the Galena-Shelter Bay ferry begins in late April.

2000 Arrow Lakes Reservoir Fertilization Project results after first year indicate algae production has increased $2^1/2$ times.

2001 In-lake kokanee abundance in the Upper Arrow Lakes Reservoir tripled to over seven million with an estimated 10 million in the Arrow system. Kokanee spawning escapement at Hill Creek Spawning Channel jumps to 142,103 compared to 47,000 spawners in 1996. Kootenay Lake kokanee abundance is an estimated 17 million fish with kokanee escapement of 560,000 spawners at the Meadow Creek Spawning Channel and nearby Lardeau River compared to 1.44 million in 1996. The decline is partly attributed to the reduction in fertilizer for two years in response to indications that the lake was being over-fertilized. The fertilizer level was returned to previous levels to increase and maintain a kokanee abundance of 25-35 million fish.

2002 Hydro-acoustic (sonar) surveys estimate 21 million kokanee in Kootenay Lake, up from 12 million in 2000. Kokanee abundance in the Arrow Lakes Reservoir reaches 20 million, a 72% increase over 2000 and a 228% increase over 1999.
CBFWCP is participating in three red-listed species recovery initiatives for upper Columbia white sturgeon, badger and northern leopard frog. A summary of wildlife habitat enhancement results to date shows CBFWCP has contributed to the restoration of 17,890 ha of grassland in the East Kootenay and enhancement of 3,500 ha in the West Kootenay to benefit ungulate populations.

CBFWCP
Fish & Wildlife Projects
1995 – 2002

ACCOMPLISHMENTS TO DATE

(not including 2002/2003 fish and wildlife projects)

Columbia Basin

FISH & WILDLIFE
Compensation
Program

www.cbfishwildlife.org

FISH AND WILDLIFE PROJECTS 1995 - 2002

Project	Status
REVELSTOKE/BIG BEND	
Wildlife	
Wolverine Ecology & Habitat Use	1995 - 2000
Grizzly & Black Bear Monitoring	1994 - 99
Willowbank Mountain Enhancement	1995 - 2000
Northern Long-Eared Bat	1995 - 98
Cummins Bio-Terrain Ecosystem Mapping	1996 - 99
Columbia Mountain Caribou Research	1995 - 99
Northern Long-Eared Bat Species Status	1995 - 96
Crawford Creek/Arrowhead Enhancements	1996 - 99
Williamson Lake Painted Turtle Crossing Assessment	Ongoing
Crawford/Alkololex Enhancement	1996 - 98
Small Wetland Enhancement	1996 - 98
Revelstoke Wetland Project Development	1996 - 97
Columbia Mountain Institute of Applied Ecology	1996 - 98
Arrow/Revelstoke Raptor Survey	1996 - 97
Illecillewaet Greenbelt Nature Park Wetland Rehabilitation Survey	1997 - 98
La Forme Creek Girdling	1997 - 98
Bear-Human Conflict Education	1996 - 99
Location of Suspected Bat Hibernicum Revelstoke Area	1998 - 99
Wildlife Tree Creation & Enhancement	1998 - 99
ROBSON VALLEY	
Wildlife	
Deer Habitat Utilization	1995 - 96
Mountain Caribou in Robson Valley	1996 - 99
Deer Habitat Use Monitoring	1995 - 99
McBride Peak Enhancement	1995 - 96
Raush Valley Enhancement	1995 - 96
Holmes River Enhancement	1996 - 97
Nevin Creek Enhancement	1996 - 97
Tete Jaune Bioterrain & Ecosystem Mapping	1996 - 97
Fisher Population Status	1996 - 97
Robson Valley Land Stewardship	Ongoing
Robson Valley Rare Bird Survey	2001 - 2002
ARROW LAKES VALLEY	
Wildlife	
Pend d'Oreille/South Salmo Enhancement	1995 - 2000
Skattebo Habitat Enhancement	1999 - 2000
Wilson/Stagleap Biophysical Mapping	1995 - 96
Pend d'Oreille Bat Survey	1995 - 96
Arrow Lakes Land Management	1995 - 2000
Forest Interior Conditions-McCormick Creek	1995 - 96
Arrow Lakes Large Mammal Monitoring (Arrow Lakes Compensation Program)	Ongoing
Pend d'Oreille Large Mammal Monitoring	1995 - 2000
Nakusp Caribou	1995 - 99
Arrow Lakes Reservoir Forage Enhancement	1995 - 2000
Pend d'Oreille Valley Habitat Enhancement	1995 - 96
Arrow Lakes Enhancement Area Identification	1995 - 96

Project	Status
Pend d'Oreille Deer/Predator Relationships	1995 - 96
Amphibian & Reptile Inventory	1995 - 96
Salmo River Harlequin Duck Inventory	1999 - 2001
Fort Sheppard Bioterrain Ecosystem Mapping	1997 - 98
West Kootenay Mule Deer Study	1996 - 2002
Arrow Lakes Land Management	1995 - 96
Bat Survey Species & Habitat Inventory	1994 - 95
Arrow Lakes Enhancement	1995 - 2000
Small Wetlands Enhancement	1996 - 97
West Kootenay Mule Deer	1996 - 97
Pend d'Oreille California Bats Study	1997 - 98
Ceanothus Planting	1998 - 99
ARROW LAKES RESERVOIR	
Fish Projects	
Hill Creek Hatchery & Spawning Channel Operations	Ongoing
Arrow Lakes Reservoir Kokanee Stock Assessment	1997 - 99
Arrow Lakes Reservoir Paleolimnology	1997 - 98
Arrow Lakes Reservoir Bull Trout Life History	1997 - 2000
Arrow Lakes Reservoir Bull Trout Genetics/Stock Identification	1997 - 2000
Arrow Lakes Reservoir Rainbow Trout Hatchery	1995 - 96
Arrow/Kinbasket Rainbow Trout Stock ID/Distribution	1998 - 2001
Lower Arrow Lakes Reservoir Tributary Inventory	1996 - 97
Arrow Lakes Reservoir Water/Nutrient Exchange	1998 - 99
Arrow Lakes Reservoir Nutrient Recycling	1998 - 99
Arrow Lakes Reservoir Productivity Study	1998 - 99
Arrow Lakes Reservoir Fish Summary	1997 - 99
Tonkawatla River Rainbow Trout Habitat Enhancement	Ongoing
Fissure Creek Diversion Feasibility Study	1998 - 99
Arrow Lakes Reservoir Rainbow Trout Stock Identification & Distribution	1998 - 99
Illecillewaet River Assessment	1998 - 99
Arrow Lakes Reservoir Trout Radio Telemetry	1997 - 2002
Burton Creek Fish Habitat Assessment	1998 - 2000
Birch Creek Plunge Pool Repair	1998 - 99
Arrow Lakes Reservoir Fertilization and Monitoring	Ongoing
COLUMBIA VALLEY	
Wildlife Projects	
Elk Habitat Use	1995 - 96
Frenchman's Ridge Enhancement	1994 - 97
East Kootenay Badger	1995 - 2001
Nestbox Monitoring	Ongoing
North Stoddart Creek Enhancement	1995 - 2000
Cottonwood Habitat Inventory	1995 - 96
Elizabeth Lake Painted Turtle Protection Project	Ongoing
Rocky Mountain Bighorn Sheep Habitat & Population Assessment	1998 - 2002
East Kootenay Lynx Ecology & Habitat Study	1998 - 99
East Kootenay Ground Squirrel Survey	1998 - 99

Project	Status
UPPER COLUMBIA	
Fish Projects	
Sinclair Creek Rehabilitation Project	2000
Bull Trout Radio Telemetry	Ongoing
Kinbasket Reservoir Kokanee Spawner Survey	Ongoing
Akololex River Habitat Improvement	Ongoing
Kinbasket/Revelstoke Reservoir Kokanee Spawning Survey	1998 - 99
TumTum Creek/Grassy Lake Habitat Improvement	1995 - 96
Camp Creek Kokanee Spawner Survey	2000
Lake Revelstoke Winter Creek Survey	2000 - 2001
Columbia Lake Burbot Population Estimate	2001 - 2002
Succour Arm Small Lake Development	1995 - 96
Upper Columbia Burbot Biology	1995 - 2001
Goldstream Creek Culvert Improvements	1997 - 98
Upper Jordan River Habitat Improvement	Ongoing
Kinbasket Kokanee Spawner Counts	1995 - 96
Dutch Creek Habitat Rehabilitation Planning	1995 - 96
Twin Bridge Creek Bull Trout Habitat Requirements	1995
Maclean Lake Outlet Spawning Platform Installation	1995
Canoe Reach Alpine Lake Inventory	1998 - 99
Kinbasket Kokanee Fishery Survey	1995
Kinbasket Lake Spring Creel Survey	1995
Hugh Allen Creek Inventory & Bull Trout Assessment	1995
Birch Creek Enhancement	1998
Revelstoke Reservoir Tributary Fish Habitat Assessment	1995
Camp Creek Flow Investigations	1995
Twin Lakes Cutthroat Habitat Improvement	1995
Revelstoke Reservoir Culvert/Fish Passage Improvement	1995
Goldstream Creek Fish Access Improvement	1995
Camp Creek Habitat Enhancement Evaluation	1997 - 99
Lake Revelstoke Littoral Habitat Assessment	2001 - 2002
LOWER COLUMBIA	
Fish Projects	
Lower Columbia/Murphy Creek Rainbow Trout Studies	1998 - 99
Murphy Creek Side Channel Repairs	1998 - 99
Norns Creek Spawning/Rearing Habitat Enhancement	1998 - 99
Salmo River Inventory & Fish Population Assessment	1995
Deer Creek Remediation Plan Enhancement	1998 - 99
Taite Creek Remediation Plan Enhancement	1998 - 99
Blueberry Creek Remediation Plan	1998 - 99
Lower Columbia Tributary Fish Flow Requirements	1995 - 96
Murphy Creek side Channel Spawner Counts & Intake Monitoring	2000
Blueberry Creek Barrier Evaluation & Mitigation	2000

Project	Status
SLOCAN VALLEY	
Fish Projects	
Little Slocan River Landslide Rehabilitation	1998 - 99
Slocan River Summer Temperatures: Implications for Rainbow Trout Distribution & Production	1997 - 98
SLOCAN VALLEY	
Wildlife Projects	
Ranch Ridge Habitat Enhancement	2001 - 2002
KOOTENAY LAKE	
Wildlife Projects	
Kupei Wetland Habitat Enhancement	1995 - 96
Small Mammal Status	1996 - 2000
Enhancement Area Identification	Ongoing
Kootenay Lake Purple Loosestrife	1997 - 98
Duncan Lardeau Enhancement	Ongoing
Northern Leopard Frog Status Survey	1996 - 2000
Wetland Habitat Enhancement	1998 - 99
Habitat Requirements for Rubber Boas	1998 - 99
Operation Bluebird	1998 - 99
Habitat Use of Northern Alligator Lizards & Western Skinks	1998 - 99
Mountain Lion Ecology & Ungulate Predation Study	Ongoing
KOOTENAY LAKE	
Fish Projects	
Kootenay Lake Experimental Fertilization	1992 - 97
Duncan River Bull Trout Radio Telemetry	1996 - 99
Meadow Creek Spawning Channel Operations	Ongoing
Kootenay Lake Fertilization Angling Evaluation	1998 - 99
UPPER KOOTENAY	
Wildlife Projects	
Townsend's Big-eared Bat Roost Hibernaculum Conservation	2000
East Kootenay Lynx Ecology & Habitat Suitability	1996 - 2001
Upper Elk Valley Winter Range Enhancement	2000
Bull Mountain Prescribed Burn Enhancement	Ongoing
Sharptail Grouse Transplant Feasibility	1996 - 97
Saddle Pasture Prescribed Burn	1997 - 98
Townsend's Big-Eared Bat Roost Monitoring	Ongoing
Elk Valley Riparian Assessment	1996 - 97
Upper Kootenay Bats	1996 - 97
Pickering Hills Enhancement	1997 - 2000
East Kootenay Trench Grasslands Restoration	Ongoing
Upper Elk Valley Range Enhancement	Ongoing
MacDonald Marsh Wetland Enhancement	1998 - 99
Sheep Mountain Prescribed Burn	1998 - 99
Tobacco Plains Wildlife Habitat Restoration	1998 - 99
Deer Lake Ungulate Winter Range Enhancement	1998 - 99
Bighorn Pasture Ungulate Winter Range Enhancement	1998 - 99
Kimberley Airport Slough	2000 - 2001
McGinty Lake Enhancement	2001 - 2002

Project	Status
UPPER KOOTENAY	
Fish Projects	
Cooperative Montana Studies	1997 - 98
Koocanusa Creel	1996 - 97
Kootenay Lake South Arm Burbot	1996 - 98
Aberfeldie & Elko Aquatic Inventory	1996
Koocanusa Kokanee Survey	1996 - 2001
Koocanusa Reservoir Kokanee Spawner Counts	1996 - 2000
Upper Kootenay River Bull Trout Radio Telemetry	1998 - 2002
Status of Columbia Basin Chiselmouth	1998 - 99
BASIN WIDE	
Wildlife Projects	
Land Management	Ongoing
Duck Nestbox Monitoring	Ongoing
CBFWCP Land Acquisition	Ongoing
Enhancement Project Identification & Development	Ongoing
Large Mammal Monitoring Plan	Ongoing
Site Enhancement Monitoring	Ongoing
Columbia Basin Biodiveristy Atlas	Ongoing
Wildlife Strategic Plan	1995 - 98
Avalanche Path Habitat Study	1995 - 2000
Tailed Frog in the Columbia Basin	2001 - 2002
Small Wildlife Projects	Ongoing
Small Red-Listed Mammals Status Study	1995 - 2000
Biophysical Map Digitizing	1996 - 97
Geographic Information System (GIS) Support	Ongoing
BASIN WIDE	
Fish Projects	
Solar Aerator Testing	1995 - 96
White Sturgeon Conservation in Reservoirs	1995 - 99
Public Interaction - Project Identification	Ongoing
Angler Log Book Program	1995 - 96
CBFWCP Fisheries Strategic Plan	Ongoing
Small Works Program	Ongoing

Glossary

Columbia Basin

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Glossary – 2000/2001 Fish and Wildlife Projects

American (East Kootenay) Badger

A predominently nocturnal, secretive animal that spends daylight hours underground, the badger is poorly understood because of the inherent difficulty in collecting information on the species. *Taridea taxus jeffersonii* is one of four subspecies of the North American badger and its B.C. range is limited strictly to the Southern Interior and the southern part of the Cariboo region.

The badger's body and other physical characteristics have moulded uniquely to its fossarial (adapted to digging) existence: stout, compact animal built low to the ground; very muscular forelegs and long curved claws up to five cm long; toes partially webbed to remove loose soil; and a body nearly as wide as it is long allowing greater maneuverability underground.

The badger breeds May – August but implantation is delayed until January or February. The female gives birth to an average of two young in March/April after an eight-week gestation period. The delayed implantation, a unique characteristic of only several mammals including the black bear, helps synchronize birth with maximum food availability to enhance their survival rate. Females breed very early, occasionally having young before they are two years old.

Badger populations are composed of two kinds of individuals: adults with established home ranges that shrink and expand seasonally; and juveniles without permanent homes that sometimes travel long distances as they disperse from their natal area. Home ranges of East Kootenay badgers overlap, averaging in size of 475 sq km for males and 46 sq km for females. Their preferred habitat is treeless areas such as grasslands, cultivated fields, cutblocks and open forests. They use a series of dens throughout their home range, usually moving to a different den daily. About 70% of the dens used were previously dug.

The badger is an efficient predator of fossorial prey, such as ground squirrels, which make up most of their diet. They are opportunistic feeders and supplement their diets with a wide range of mammals, birds, eggs, reptiles, amphibians and invertebrates. This allows them to adjust to seasonal availability. As well, badger are physic ically and behaviorally adapted to deal with food shortages and cold temperatures. They can reduce heat loss and limit energy expenditure by remaining inactive within the den during the coldest periods. While badgers have few natural enemies, their populations are particularly sensitive to human-caused mortality. Roadkills, human intolerance and accidental capture in traps set for coyotes can account for 90% of badger deaths in some populations.

Apthona nigriscutis

One of several insects approved for release in North America in 1989 and widely used in Western Canada, lays its eggs on leafy spurge. The larva feeds on the spurge's roots and kills the weed.

Arrow Lakes Reservoir

Created in 1968, the Arrow Reservoir is formed from two natural lakes—Upper Arrow and Lower Arrow—and has water storage capabilities of 8.8 trillion cubic meters. Water levels are maintained between 420 – 440 m. The water flow is regulated between the Revelstoke Dam and Hugh Keenleyside Dam.

Bio-agent

An insect (or microorganism) introduced in a controlled setting to help manage or eliminate a specific species (e.g. Leafy Spurge or Purple Loosestrife) where other control mechanisms such as herbicides are ineffective or environmentally unsafe.

Biodiversity

The variety, distribution and abundance of different plants, animals and microorganisms relative to the ecological functions they perform within a specific area or region.

Bioterrain Map

A map of the physical/geographical characteristics of a region combined with data that is relevant to wildlife habitat, including soil moisture conditions and vegetation.

Black Bears

The American Black Bear currently occupies about 85% of its historical range and has been eliminated from most of the more southerly regions of all provinces, primarily through human encroachment. *Ursus americanus* requires a mixed forest habitat with a variety of tree and shrub species of varying ages. While mainly vegetarians, they are also scavengers and attracted to carrion which they can scent up to a mile away. Black bears have the lowest reproductive rates of any land mammal in North America—with the possible exception of the muskox. They have several remarkable characteristics: while they mate in midsummer, the fertilized eggs remain unattached to the female's uterus until fall and their minimum body weight in preparation for hibernation is attained. The cubs are born late December to early February which the mother nurtures without having consumed any food for up to five months.

Blue-Listed Species

A **vulnerable** fish or animal that is particularly sensitive to human activities or natural events, and:

a) populations have recovered or increased to a point where extinction is unlikely as long as currently available habitat is preserved or managed;

b) populations have experienced no evidence of a decrease for the last three-to-five years;

c) populations are so low that the species is uncommon within its range or confined to a small geographic area;

d)the species' habitat requires protection and other activities in the area regulated.

Brood stock Collection
The capture of adult fish to obtain eggs and milt, primarily used in hatcheries to increase fish production.

Bull Trout
Bull trout (*Salvelinus confluentus*) are members of the char family and have recently been classified as a separate species from Dolly Varden. Found in lakes and streams throughout the upper and lower Columbia and Kootenay systems, bull trout are identified by a dusky-coloured dorsal fin without bold black marks and the spots on the trout's sides are not surrounded by light haloes. The fish is a sub-surface feeder with kokanee as its primary food source. Bull trout mature slowly and often reach five-seven years of age before beginning to spawn. They can live for more than 20 years and reach a size of nearly 13.5 kg.

Burbot
Lota lota is a member of the codfish family and recognized by its long body, elongated dorsal and anal fins, and a single barbel on the tip of the chin. The burbot, which grows up to 100 cm, is common in lakes and large rivers throughout the upper Columbia and upper Kootenay part of the Columbia River. The primary food sources for larger burbot include kokanee and other small fish, as well as aquatic insect larvae. The burbot, also known as ling cod, spawns in February at nighttime under the ice in shallow bays or in streams. A number of burbot will mill together to form a large ball which may stay together for several minutes. A sport fish, the burbot's liver contains oil comparable to salt-water cod in vitamin richness.

Canopy
A layer of foliage in a forest stand, most often referring to the uppermost layer of foliage, but the term can be used to describe lower layers in a multi-storied stand. It includes above ground leaves, branches and vegetation that provide shade and cover for fish and wildlife.

Conserve
To manage human use of living (animals, plants) and non-living (e.g. soils, nutrients) resources in an ecosystem in an attempt to restore, enhance, protect and sustain the quality and quantity of a desired mix of species and ecosystem conditions for present and future generations.

Creel Survey
The collection of data specific to the number of fish caught by sport fishers on a particular stream or in a particular area such as the Arrow Lakes Reservoir.

Drawdown
The controlled limited drainage of a body of water such as a marsh to improve wildlife habitat and food values. Drawdowns are also used as a method of flood control in reservoirs.

Duncan Dam
Built in 1967 and the first of three BC Hydro Columbia River Treaty dams, Duncan Dam is located 42 km. north of Kaslo. The 40-meter high structure created a 45 km long reservoir that holds 1.7 trillion cubic meters of water.

Duncan/Lardeau Property
A 200 ha parcel of property in the Meadow Creek area purchased by CBFWCP in 1998 to be enhanced for its wildlife values. The property is adjacent to eight similar and inter-connected properties in the area which together form corridors for traveling wildlife.

Enhance
To heighten specific environmental values of a habitat or ecosystem by management intervention to reduce the severity of undersirable impacts.

Escapement
The number of adult fish that return to their spawning grounds in a given period of time.

Extirpation
The elimination or disappearance of a species or subspecies from a particular area, but not from its entire range.

Fauna
All of the animal life found in a specific region, e.g. Columbia Basin.

Fertilization
Adding nutrients, usually phosphorus and nitrogen, to a body of water that are essential to the growth and well being of its living organisms.

Fish Technical Committee
Comprised of four members, two each from BC Environment and BC Hydro, this committee is responsible for the review, evaluation and recommendation of fisheries-related projects submitted to CBFWCP.

Fry
The second developmental stage of young salmon and trout. During this stage, the fry is usually less than one year old, has absorbed its yolk sac and is rearing in the stream. The main stages of development are: egg, fry, juvenile and adult when sexual maturity has been reached.

Gerrard Rainbow Trout
A strain of rainbow trout (*Oncorhynchus mykiss*) native to the Columbia Basin system, the adult Gerrard are primarily lake dwellers and not normally found in rivers or streams, except during spawning. A slow growing fish, the Gerrard matures later than most rainbow strains and can live for up to 20 years. It feeds

mainly on kokanee salmon which helps account for the size of up to 16 kg this popular sport fish can achieve. Gerrard trout over 4.5 kg consume around 200 kokanee per year. A lake with 3000 Gerrard rainbow trout would eat about 600,000 kokanee annually. The Gerrard Rainbow Trout spawn only in the Lardeau River system.

Girdling
A wildlife enhancement technique used for: creating food for browsing ungulates by stimulating suckering (creation of new growth) of favourable browse from shrubs; and creating habitat in trees for cavity-nesting birds and small mammals.

Grizzly Bears
The Grizzly Bear is a subspecies of the Brown Bear which also includes the Kodiak Bear. Ursus arctos horribilis are slow-growing, long-living (20 – 25 years) with low reproductive rates averaging 2 cubs per litter every 3 – 6 years. Females can grow up to 280 kg (640 lb) while males can achieve sizes of 500 kg (1150 lb) depending on the food supply within their range. Grizzlies have only six months to obtain sufficient food to last a full year. Pregnant females have less time because they den early and exit later. The species have relatively short stomaches. Consumed food passes rapidly through their systems resulting in a high rate of food consumption. In fact, starting around mid July, grizzlies feed 20 hours a day and consume more than 20,000 kcal (1,000 calories) a day in preparation for hibernation. Grizzlies compete directly—and often aggressively—with humans for food and space which greatly affects their nutritional levels and survival.
While population densities vary based on abundance and distribution of food, Glacier National Park has a density of 1:28 sq km, which is considered average. Contrary to popular belief, grizzlies have good eyesight. As well, their hearing is excellent while their sense of smell is superb. Grizzlies are omnivores and their movement patterns within their range is determined by the quality of their food supply at different times of the year. For example, moose and caribou are a main source of their diet, but primarily in the spring when yearlings and winter-starved ungulates are the most vulnerable. While they adapt slowly to changes in their environment, grizzlies can, if given time, adapt behaviorally to altered habitat.

Habitat Complexing
The application of logs, rocks and/or vegetation to enhance stream habitat for fish. For example, boulders that change the water-flow patterns and offer fish shelter are said to add complexity. Primarily, this allows for better spawning and rearing habitat as well as providing cover for fish.

Hibernaculum
The hibernating habitat for bats, typically found in abandoned mines, abandoned buildings and similar enclosures.

Home Range
The area that an animal traverses in the scope of normal activities, such as feeding. For example, the home range of a male badger in the East Kootenay area can be 500 square km, typically much larger than the home range of badgers studied in the US.

Hugh Keenleyside Dam
Hugh Keenleyside Dam, located eight km east of Castlegar, controls a drainage area of 22,560 sq km in the Arrow Lakes Reservoir extending 232 km north to Revelstoke. The dam, 52 m high and 853 m long, includes a navigation lock providing passage for river traffic.

Hybridization
The process of interbreeding between two different species, such as yellowfin rainbow trout with other rainbow trout species, either in the wild or under artificial conditions.

Kinbasket Reservoir
Created as a result of the Mica Dam and generating station, this 216 km long water storage reservoir can see its water level decrease/increase by up to 24 meters from 744 meters in late summer to 730 meters in April.

Knapweed
Introduced from Eurasia in the early 1900's and with no natural enemies or parasites, Knapweed spread rapidly across BC and became well established in this area over the past three decades. Both types of the weed, Diffuse and Spotted, are present in the Columbia Basin. **Diffuse Knapweed** is recognizable by its white (sometimes pink or purple) urn-shaped flower surrounded by yellowish green bracts with narrow stiff spines. **Spotted Knapweed** has pink to purple flowers with a black-tipped fringe, giving the flowerhead a spotted appearance. Both types contain volatile oils which have an extremely bitter, non-poisonous taste.
Both species invade grassland sites and outcompete all native vegetation. As well as severely reducing the grasses and herbs food supply of domestic animals, knapweed encroachment can also destroy wildlife forage resulting in significant declines in deer and elk populations. Over 40,000 hectares (100,000 acres) in BC are currently infested, potentially reducing forage by up to 90% in some areas.
Successful long-term control requires a combination of proper grazing management, judicious herbicide use, bio-agent control and a high level of public awareness and responsibility. While these plants are highly resistant to most herbicides, several insects have proven effective including seed-reducing flies and moths, and a root-feeding beetle.

Kokanee
Sockeye salmon that became landlocked in BC lakes after the last ice age and adapted to their freshwater habitat, kokanee (Oncorhynchus nerka) occupy open waters at intermediate depths. While their primary food source is zooplankton and

phytoplankton, kokanee will also eat insects and mysid shrimp. Kokanee have retained many of the biological and instinctive characteristics of their sockeye ancestors. After four to five years in the lake, red-flanked adult salmon will return to their spawning stream in the fall, lay and fertilize their eggs, and then die. The kokanee, which can grow to 4.5 kg, is a popular sport fish but serves a more important function as the main food source for bull trout and Gerrard rainbow trout.

Koocanusa Reservoir

Formed by the Libby Dam in Montana as part of the Canada/U.S.Columbia Treaty, this reservoir is 145 km long, with the upper 68 km located in BC. Water levels are controlled by the Libby Dam at Libby, Montana, 77 km south of the BC border. The dam, constructed and operated by the U.S. Army Corps of Engineers, is owned by the U.S. government.

Leafy Spurge

A perennial, hardy weed that spreads by seeds as well as buds on persistent, creeping roots, leafy spurge is an aggressive competitor with no natural enemies. The weed grows quickly in clumps, forming dense and extensive stands. A nonindigenous plant, leafy spurge has spread from Pacific northwest states into the grasslands and open forests of the southern BC interior, including the East Kootenay and Boundary regions. All parts of the plant contain a milky-coloured latex juice that can poison livestock and cause skin irritations on humans. Herbicides are ineffective in controlling leafy spurge. The best control methods involve using approved Euroasian bioagents, specifically several subspecies of flea-beetles and moths.

Lewis' Woodpecker

While the Lewis Woodpecker ranges throughout Southern BC, Bull Mountain is one of the only known local wintering habitat site in Western Canada. Melanerpes lewis, which can grow to 29 cm from beak to tail, is identifiable by the extensive pinkish red belly (the only North America woodpecker with this colour) and wide black wings. The preferred habitat of the Lewis Woodpecker is burns, scattered or logged forests, river groves and foothills.

Limnology

The study of aquatic ecology or interactions between aquatic organisms and their physical and chemical environments.

Mica Dam

The largest of the three Columbia River Treaty hydroelectric developments, Mica rises 200 m above the riverbed and is an earthfill structure made up of 33 million cubic metres of gravel, sand, rock and glacial till. The dam, in operation since 1973, impounds the Kinbasket Reservoir as well as regulates water flow into Revelstoke Reservoir.

Mitigate

To reduce the severity of impacts on fish or wildlife habitat.

Moose

Alces alces is the largest member of the deer family and one of the largest land mammals in North America. Males can weigh up to 595 kg and females 418 kg. The life cycle of the moose begins with rutting season from early September to late November. After a gestation period of eight months, females typically give birth to one calf, although two is not uncommon, in late May or June. The pregnant female seeks seclusion as birth time approaches and will aggressively drive away her young from the previous year to devote her attention to the new calf. The newborn calf is licked copiously and regularly, establishing a strong cow-calf bond. Moose calves receive a substantial proportion of its food from its mother's milk until fall.

There are four subspecies of moose including the Columbia Basin's Shira's moose (Alces alces shirasi). They are solitary animals and keep to a small home range of 5 – 10 sq km. While moose are not territorial, cows are very aggressive to one another during the rut, in contrast to other antlered species.

Moose are a very hardy and adaptable species, evident in that they winter successfully in some of the coldest regions of the world. They will adapt to a variety of available forage, but their preferences is early succession plants found in new growth areas after fires and logging, willow, forbs and aquatic plants.

The primary limiting factor of moose populations is good habitat. Their winter mortality is related to snow depth, density, hardness and the duration of these factors. As well as restricting forage, deep snow leaves moose snowbound and vulnerable to wolf predation. Other mortality causes include: bear predation on calves in spring; competition for forage with deer, elk and livestock; and collisions with vehicles and trains.

Mountain Caribou

Rangifer tarandus caribouis is a member of the deer family. Caribou are unique in that both the male and females have antlers. Nonpregnant females shed their antlers in March or April, while pregnant females will shed their antlers at the time of calving. Breeding occurs during a one-week period between mid to late October and, after a gestation of 228 days, 90% of the females will give birth to a single calf within a 10-day period.

Caribou's reproduction rate is low while the mortality rate is high. While calves are able to follow their mothers around within one hour after birth, they are highly vulnerable to predation. Calf mortality can exceed 90% where there are high densities of wolves and/or grizzlies. As well as predation, calves are susceptible to wind chill and starvation.

Caribou are highly adapted to their environment and adaptable to a changing environment. They eat a wider variety of plants than other deer species, but prefer green vascular plants, mushrooms, grasses, sedges and cottongrass. In winter when the snow crust will support their weight, caribou will shift from open habitats to forest

cover seeking arboreal lichens growing on coniferous trees. As well, they can smell food buried under snow up to 18 cm.
Ideal winter feeding conditions include: irregular terrain with variable snow depths; habitat with three vegetation strata—ground, shrubs and well-spaced trees; and shallow, hard snow.

Mule Deer

The populations of Rocky Mountain Mule Deer (Odocoileus hemionus hemionus) is larger than all 11 mule deer subspecies in North America combined. Remarkably adaptable, this mule deer is migratory and will travel 80 km or more from summer to winter ranges. They breed in November-December and will typically bear two fawns in June which minimizes fawn exposure to late spring or early fall snowstorms.
Mule deer capitalize on abundant and nutritious forage in summer and fall for growth and weight gain, and minimize intake and expenditure in winter when energy costs are high and forage is poor. They store fat rapidly from April to October, but deplete most of it by December and reach a low weight in March. Females gain and lose weight more slowly and reach their low weight in May. The survival of mule deer is a matter of enduring to long periods of inadequate forage, an environment they have evolved in and adapted to in North America.
Intermediate feeders rather than browsers, mule deer consume a wide range of forage types in a wide range of climatic conditions. Major causes of population declines are: human encroachment in deer habitat; predation; forest fire suppression; forest encroachment; excessive hunting; and collision with vehicles.

Mysid Shrimp

An exotic shrimp introduced into Kootenay Lake from Upper Waterton Lake (Alberta) in 1949 as a supplementary food source for intermediate-sized rainbow trout and in Arrow Lakes Reservoir in 1968 for young fish-eating trout. Instead, *Mysis relicta* became an efficient competitor with kokanee for zooplankton.

Nestbox

Constructed with 25.4 mm. cedar, these new custom-built homes for tree cavity-nesting ducks are placed in cottonwood and aspen trees seven to ten metres off the ground. Six species of cavity-nesting ducks use these nestboxes. While there are good stands of cottonwood and aspen trees—the ducks' preferred nesting sites—in their wetlands habitat, there are not enough natural tree cavities to support the total populations' needs.

Nitrogen

A colourless, tasteless, odourless gaseous element which makes up 78% of earth's atmosphere, nitrogen is an essential component of proteins and nucleic acids required by all living organisms. In the aquatic food chain, nitrogen enters lakes through the air as nitrates where it is converted to complex organic compounds by bacterial action and absorbed by drifting microscopic plants called phytoplankton. Phytoplankton is consumed by zooplankton which, in turn is eaten by mysid shrimp and kokanee salmon. These salmon are the main food source of bull trout and Gerrard rainbow trout. When aquatic living organisms die and decay, the complex organic compounds are reduced to nitrates again to complete the nitrogen cycle.
If lakes don't have adequate water flows and circulation, the nitrates settle on the bottom where they are locked in and effectively removed from the nitrogen cycle and the food chain. This reduces the abundance of phytoplankton and the domino effect can contribute to declines in kokanee populations and sizes.

Northern Leopard Frog

Once a very common species in northwestern US and BC, and a favourite specimen in high school biology experiments, their populations have been decimated by several causes including: diseases believed to be related to environmental stress; habitat loss; and increase in ultraviolet light exposure resulting from a thinning ozone layer. The preferred habitat of Rana pipiens is marshes, wet meadows, river banks and moist, open woods.

Northern Long-Eared Bat

One of the rarest bats in BC, two of only three known habitats are in the Revelstoke area. It's diverse diet includes caddisflies, moths, beetles, flies and leafhoppers. Myotis septentrionalis hibernates alone in caves and abandoned mine tunnels, has small maternity colonies of up to 30 individuals and females produce a single young in late June to early July.

Nutrient Levels

The amount of nutrients, particularly phosphorus and nitrogen in water bodies, in an ecosystem.

Oligotrophic

Waters that are poor in disolved nutrients, have low photosynthetic productivity, and are rich in disolved oxygen at all depths.

Painted Turtle

The most common turtle in the United States, Chrysemys picta is found in only southern parts of Canada and is blue-listed as a rare and vulnerable species in many parts of the Columbia Basin. Its name comes from the bright red and yellow markings on a black or greenish brown flat shell and distinctive yellow stripes on the head and neck. Painted turtles are small: only 6 to 25 cm with the female growing larger than the male.
The painted turtle breathes by forcing air in and out of its lungs by alternately contracting the flank and shoulder muscles. It can't expand its chest to breathe because the ribs are fused to the shell. The turtle prefers quiet, shallow, thickly-planted freshwater with a muddy bottom. It's main food diet includes worms, minnows and aquatic insects.
Painted turtles mate in the fall and spring. In June to early July the females travel a short distance to an area where they lay 5

to15 oval, soft-shelled eggs in a flask-shaped hole they dig with their hind legs. The eggs hatch in about 10 weeks. Lacking sex chromosomes, the sex of painted turtles is determined by temperature during incubation: low temperatures make males and high temperatures produce females. Hatchlings face heavy predation from ravens, gulls and Great Blue Herons from the time they leave the nest. Quick movements, good sense of smell and colour vision are their defenses against predators.
To rid themselves of parasitic leeches, the turtles bask in the sun on rocks, stumps or trees partially submerged in water, often in large groups. Under stressful conditions in captivity they can produce Salmonella.

Paleolimnology
The study of the physical properties of freshwater lakes in prehistoric times, specifically Upper Arrow Lake geochemistry (nitrogen, carbon and phosphorus) conditions, algae evolution and fossil zooplankton.

Partnering
The synergistic affect from pooling of resources to work together toward a common goal. This reduces duplication of effort, helps ensure that the appropriate level of resources are available. The savings in time, money and expertise can then be reinvested into other projects.

Phytoplankton
A microscopic plant life that are an important source of food for zooplankton, which are, in turn, food for kokanee and mysid shrimp. Fertilization projects underway in Kootenay Lake and the Arrow Lakes are adding nitrogen and phosphorus to these water systems to produce healthy levels of phytoplankton to stimulate the food chain.

Phosphorus
An allotropic (element that can exist in two or more forms, e.g. diamonds and graphite are allotropes of carbon) nonmetallic element in phosphates, phosphorus is a nutrient required by all living organisms. Phosphates occur naturally in the different strata of rocks throughout the earth including under bodies of water such as lakes. In the aquatic food chain, phosphates are leached into the water where it is converted by bacteria into the complex organic compound phosphorus and absorbed by phytoplankton (drifting microscopic plants).
Phytoplankton is consumed by zooplankton which, in turn is eaten by mysid shrimp and kokanee salmon. These salmon are the main food source of bull trout and Gerrard rainbow trout. When aquatic living organisms die and decay, the complex organic compounds are reduced to phosphates again to complete the cycle.
Some phosphates settle on the bottom where they are locked in and effectively removed from the food chain. This reduces the abundance of phytoplankton and the domino effect can contribute to declines in kokanee populations and sizes.

Prescribed Burn
The planned use of carefully controlled fire for habitat enhancement. Prescribed burns are commonly used to prepare a site for planting, create a better quality browse for wildlife, manage a fire hazard and reduce pest problems. The timing of the burn is determined by a combination of conditions including weather, fuel moisture, soil moisture and relative humidity to ensure the fire is confined to the planned area. For example, the Saddle Pasture prescribed burn took nearly two years to implement because of unacceptable weather conditions.

Productivity
The gain in weight which the total number of a species in a specified area (e.g. kokanee in Kootenay Lake), or the total number of all living organisms in a specified area, accumulates in a given period of time.

Protect
To manage the conservation of ecosystems, habitat or species by management intervention.

Protection Projects
Improvements to habitats to ensure the preservation of resident fish and wildlife populations.

Public Involvement Process
An Important focus of the Program where residents and interested groups are encouraged to submit specific projects in which they will participate and that will protect or enhance fish, wildlife or their habitats in the Columbia Basin.

Purple Loosestrife
Accidently introduced to North America from Europe in the 1800's, purple loosestrife has made a slow relentless invasion of wetlands across Canada. While the weed prefers wetlands, it is as devastatingly effective in dryland habitats as well. Each plant can produce up to 2.7 million seeds a year. Growing up to 2 m high with square woody stocks, a colony of purple loosestrife forces wildlife to consume native vegetation around the weed, creating more space for new loosestrife to grow. Pulling and digging the plants by hand, a labour-intensive exercise, is still one of the most effective ways of dealing with the infestation problem.

Rearing Habitat
Areas in rivers or streams where juvenile salmon and trout find food and shelter to live and grow.

Red-Listed Species

An endangered or threatened fish or animal facing imminent extinction or extirpation (no longer live in the wild in BC but do live elsewhere) if certain factors are not reversed. These factors include: very few native populations exist; and remaining populations are declining drastically due to habitat loss, excessive harvest, natural catastrophes, environmental stresses or other factors caused by human activities such as pollutants. The criteria include:

a) the number of offspring that survive to an age where they can reproduce is only marginally higher or lower than the number of offspring that die during the same time period;
b) habitat essential to the species' survival is adequately protected for the foreseeable future through management and preservation;
c) the population is stable or increasing but their numbers are still very small;
d) captive or cultivated stock may have to be used if the remaining population isn't large enough to reproduce sufficient numbers of offspring; and
e) the factors causing the species' decline are still evident.

Rehabilitate

To restore the functions and processes of a degraded ecosystem or habitat to an effective state rather than an original state.

Restore

To return ecosystems or habitats to their original structure and species composition.

Revelstoke Dam

Located about five km north of Revelstoke, the dam created a reservoir 130 km long extending back to Mica Dam and has a surface area of 11,534 hectares. The dam is a 175 m high concrete gravity structure with a 122 m high earthfill dam.

Riparian zone

The area of land from the shoreline of a river or lake to roughly 30 – 60 m inland. This habitat supports a wide variety of species dependent on water systems including raptors.

Although riparian areas make up only a small fraction of land, they are among the most productive and valuable of all landscapes. These areas act as a buffer and filter to maintain water quality and provide forage, shelter and habitat to both wildlife and livestock.

Rocky Mountain Bighorn Sheep

One of three types of mountain sheep in North America, the Rocky Mountain Bighorn sheep is the biggest with the ram weighing up to 143 kg and the ewe 91 kg. Few animals are as well adapted to extremes of elevation and temperature. Their preferred range is rocky escape terrain in close proximity to open stands of their preferred food: grasses, sedges and shrubs. Browse vegetation are important foods during fall and winter. The sheep is also attracted to natural and artificial salt licks, particularly during spring and early summer, to correct a sodium imbalance caused by high intakes of potassium and water from new spring forage.

R.M. Bighorn sheep are highly social animals that are separated into two groups: nursery bands of ewes, lambs and subadults that stay on smaller nursery ranges; and ram bands comprised of males three years old and older that forage away from the nursery range and travel great distances to known feeding ranges. These two groups come together to rut in November/December and again in the spring as sprouting vegetation appears.

The total population of all R.M. Bighorn sheep in North America numbers less than 25,000, with over 1,400 in British Columbia. Competition with livestock for food and parasites/diseases contracted from livestock are major causes for this bighorn sheep's decline. Pneumonia caused by Lungworm, one of 51 strains of parasites and diseases they contract from livestock, have been known to decimate herds particularly in overprotected and overcrowded ranges.

Sharptail Grouse

While still fairly common inland in the northwestern U.S. and Western Canada, sharp-tailed grouse populations have been on the decline. A pale and speckled brown grouse, *Tympamuchus phasianellus* can be recognized by its short pointed tail which shows white at the sides when in flight. The displaying male inflates purplish neck sacs. The preferred habitat of Sharp-tailed Grouse includes prairie, clearings, open burns in coniferous forests, forest edges and bushy groves.

Silviculture

The science and practice of controlling the establishment, growth, composition, health and diversity of forests and woodlands. Silviculture entails the manipulation of forest and woodland vegetation in stands and on landscapes.

Spawning Channel

A man-made 'tributary' that simulates habitat conditions fish need to spawn naturally and on their own. This includes streamside vegetation and gravel beds at a uniform width and depth with pockets of deeper pools. A channel is constructed according to the species' requirements and their projected numbers. For example, the Hill Creek spawning channel is 3.2 km long and designed to accommodate 100,000 kokanee requiring .5 sq m of space for each fish.

The survival rate of fry and eggs are substantially higher in man-made channels than natural tributaries. Kokanee have a five percent survival rate in natural spawning tributaries, but 30% – 60% survival in the spawning channel.

Species
A species, subspecies or biologically distinct population of animal, plant or organism, other than bacteria or virus, that is wild to nature and is native to B.C. or has extended its range into B.C. without human intervention and has been present here for at least 50 years.

Stand Management Prescription
A site-specific operational plan describing the nature and extent of silviculture activities planned for a free-growing stand of trees for specified social, economic and environmental results.

Sustain
To maintain desired levels of ecological processes and functions, biological diversity and productivity of an ecosystem over the long term.

Tagging
CBFWCP biologists use a variety of radio-tagging methods to gather information in fish and wildlife projects. These include radio telemetry collars on wolverines, implants in bull trout and yellow-fin rainbow trout and "fanny packs" on Northern leopard frogs. Tagging is used to study the movement, migration, habitat requirements and other behavioral characteristics of a species very accurately and cost effectively.

Telemetry
The tracking of subjects using radio transmitters and receivers, often by plane or satellite. The radio transmitters can be in the form of collars (on animals) or implants (on fish).

Townsend's Big-eared Bat
The maternal colony in the Saint Eugene Mission on the St. Mary's Band Reserve represents 25% of all known Townsend's Big-eared bats in Canada. Unlike many bat species which travel great distances to hibernate, Plecotus townsendii travels only about 40 km. between their maternity roosts and hibernacula (hibernating roost). Also known as the Lump-nosed bat and Western Big-eared bat, they are identified by enormous ears almost one-half its body length. Townsend's Bat feeds primarily on small moths and grows to only 12 grams—little more than the weight of a loonie. A single pup is born in July and is flying in three weeks.

Ungulates
Hoofed, grazing mammals, many of which have antlers and four-chamber stomaches, in the group *Ungulata*. In the Columbia Basin, these include deer, elk, bighorn sheep, moose, mountain goat and caribou.

Wetlands
Areas of land inundated by surface water and groundwater supporting vegetative or aquatic life that require saturated or seasonally saturated soil conditions for growth and reproduction. There are five wetland classes: bogs, fens, marches, swamps and shallow open waters.

Wildlife Technical Committee
Comprised of four members, two each from Ministry of Water, Land & Air Protection and BC Hydro, this committee is responsible for the review, evaluation and recommendation of wildlife-related projects submitted to CBFWCP.

Wolverine
Solitary, secretive animals that live primarily in boreal forests and tundra areas, wolverines typically occupy back country or wilderness areas that have little human activity or development. *Gulo gulo* have few natural enemies and are very well suited for the environment in which they live. They have exceptional stamina and can cover great distances in a relatively short time period. Wolverines can withstand severe cold, exhibit keen senses of hearing and smell, have a caching instinct and can defend a food source from larger predators. Their extremely strong teeth and jaws can crush bones up to the size of the bones of an adult moose. While wolverines have poor eyesight, their acute sense of smell can locate carrion buried under 200 cm of snow. Their average weight is 10 – 17 kg for males and 7 – 14 kg for females. Wolverines breed during early summer and carry the dormant unimplanted embryo until the following December or January when implantation occurs. Litters are 2 – 3 kits with each weighing an average of 84 g when born. At one per 150 – 200 sq km, wolverine population densities are low compared to other carnivores. Their home range sizes are large, averaging one every 535 sq km. Like many carnivores, their density and home range is related to the abundance and availability of food. An opportunistic feeder, wolverines are capable predators and efficient scavengers. Carrion is a major food source, particularly moose, elk, caribou and deer. They are also successful predators of small animals including grouse, ptarmigan, voles, mice and squirrels. Primarily nocturnal animals, wolverines are active year round and don't migrate from their home range.

Yellow Fin Rainbow Trout
The Arrow Lakes traditionally supported a trophy rainbow trout fishery for the piscivorous (fish-eating) yellow fin rainbow trout. These fish were large (up to 14 kg) with a yellow-orange colour on their bellies and pectoral, pelvic and anal fins. The flooding of the lakes almost completely eradicated this stock and few of these fish were caught between the mid-seventies and early eighties. Earlier attempts to preserve and enhance this population by collecting brood stock had some success. However, this method was very labour-intensive and insufficient numbers of adults were found and collected to help the yellow fin make a comeback.

Zooplankton
Drifting or floating microscopic animals found at various depths in lakes, rivers and seas. Zooplankton is the primary food source for kokanee and mysid shrimp.

Project Application Information

The deadline for Large Project Applications ($10,000 or more) is August 1. Small Project Applications (less than $10,000) can be submitted anytime during the project year.

Applicants are encouraged to involve CBFWCP biologists or the appropriate representative in preparing their project applications for submission.

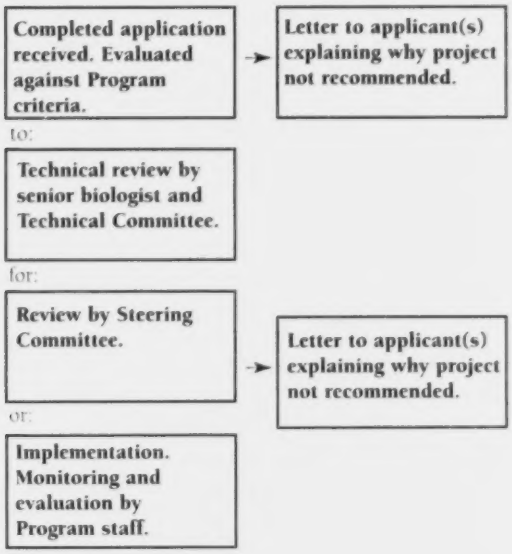
Columbia Basin

FISH & WILDLIFE Compensation Program

www.cbfishwildlife.org

HOW ARE PROJECTS SELECTED?

Project applications are reviewed by various individuals and committees to ensure that they are cost effective, achievable, biologically appropriate and socially desirable. The following flow-chart illustrates the process.


Completed application received. Evaluated against Program criteria.
Letter to applicant(s) explaining why project not recommended.
to:
Technical review by senior biologist and Technical Committee.
for:
Review by Steering Committee.
Letter to applicant(s) explaining why project not recommended.
or:
Implementation. Monitoring and evaluation by Program staff.

The final project review and selection is made by the Steering Committee, which is also responsible for the overall direction of the Program. Members of the Steering Committee are:

Government of British Columbia
Wayne Stetski – Co-chair, MWLAP (Cranbrook)
Jamie Alley, MWLAP (Victoria)

BC Hydro
Hugh Smith – Co-chair (Burnaby)

Public Representatives*
Southwest Kootenays – Richard Spilker (Nelson)
Ph.(250) 352-2660 Email: spilk@direct.ca

Northern Kootenays – Pat Wells (Revelstoke)
Ph.(250) 837-5792 Email: patwells@rctvonline.net

Southeast Kootenays – Greg Mustard (Windermere)
Ph./Fax (250) 342-3114

First Nations Representative*
Ktunaxa-Kinbasket Tribal Council – Joe Nicholas (Windermere)
Ph.(250) 342-6301 Email: akisqnuk@rockies.net

*You are encouraged to contact the nearest appropriate representative or Program biologist to discuss your project idea before submitting your application.

WHAT KINDS OF PROJECTS WILL NOT MEET CRITERIA?

The Compensation Program will support activities that complement and do not duplicate the work of other agencies and organizations, and will seek partnerships with other groups whenever possible.

The following activities are examples of unacceptable projects. Please ensure your project proposal does not include:

- construction of boat launches, recreational access and recreation sites
- debris clean-up on reservoirs
- ongoing administrative costs for interest groups or organizations
- compensation for individual losses resulting from hydroelectric development
- promotion of business opportunities

In addition, projects must conform with current resources management objectives and with established practices, legislation and policies (e.g. Wild Fish Policy).

Project evaluation is a three stage process involving a non-ranked set of required criteria, a ranked set of criteria applied by the Technical Committees and a non-ranked set of considerations applied by the Steering Committee. Members of the Technical committees are:

Fish Technical Committee
Bob Forbes, MWLAP (Cranbrook)
Ken Ashley, BC Fisheries (Vancouver)
David Wilson, BC Hydro (Burnaby)
Gary Birch, BC Hydro (Castlegar)

Wildlife Technical Committee
Guy Woods – Chair, MWLAP (Nelson)
Bob Forbes, MWLAP (Cranbrook)
Glen Watts, MWLAP (Prince George)
Ed Hill, BC Hydro (Burnaby)
Alan Chan-McLeod, BC Hydro (Burnaby)

Communications Committee
Barry Bartlett, CBFWCP (Nelson)
Bob Gammer, BC Hydro (Castlegar)
Wayne Stetski, MWLAP (Cranbrook)

LARGE PROJECT APPLICATION

1. Introduction to the Program

The Program is a joint partnership of BC Hydro (BCH) and the Government of British Columbia. It was created to deliver and fund a variety of activities that help conserve and enhance fish and wildlife populations in the Canadian portion of the Columbia River system. Enhancement activities started as long as 15 years ago and some of them continue (e.g., spawning channels and hatchery operations). Other activities will evolve from new proposals submitted by members of the public, the two partner agencies or other organizations. All ongoing and new projects will be funded from the annual budget of approximately $3.2 million (indexed for inflation).

The specific objectives of the Program are to:

- Enhance existing fish and wildlife habitat in areas affected by BC Hydro's hydroelectric developments in the Columbia River Basin. For example a project to improve spawning areas at the mouth of a fish-bearing stream that feeds into a reservoir.
- Enhance habitat in other areas where the opportunity for on-site enhancement has been significantly reduced or eliminated by reservoir development. For example, a project to improve deer winter range similar to habitat lost due to flooding.

Projects will be considered for funding under this Program if they support one of the above objectives.

2. Small vs. Large Projects

This application process is designed for larger, more complex and more scientifically rigorous projects with an annual budget of greater than $10,000. A separate, simplified process is available for small projects of $10,000 or less (Small Project Application). If you are unsure which application process is more suitable for your project idea, consult the local Program office (see addresses on last two pages in this handbook).

3. Submission Deadline and Format

There is only one intake of larg project applications each year. All applications must be received by the deadline of **4:30 pm on August 1**. If August 1 is not a working day, the deadline will move to the next working day. For example, if August 1 is a Saturday, the deadline will be 4:30 pm on Tuesday, August 4 (since the first Monday of August is a civic holiday). Applicants should mail, courier, fax, e-mail or hand deliver one copy of the completed application package to any of the Program offices.

As explained below, the application consists of two parts: a Project Summary & Budget form and a Project Outline (see #8). Both must be typed. Note that proposals that are incomplete, late or hand-written will not be considered.

4. Eligible Proponents and Projects

Project proponents may be individuals or organizations. The Program will support projects that complement and do not duplicate the work of other agencies and organizations, and that involve partnerships with other groups whenever possible.

In meeting the two broad objectives of the Program (see #1 above), projects may directly address habitat enhancement or they may indirectly address habitat and population issues. Four types of activities will be considered for funding by the Program:

- **inventory** and **assessment**, to describe the current situation. For example, conducting a population count of deer in a particular area and assessing their habitat.
- **design** and **planning**, to define how the current situation can be improved. For example, researching the habitat needs of deer, comparing these requirements with the results of a habitat assessment, and developing a plan to achieve improved habitat.
- **enhancement** or **restoration** activities.
- follow-up **evaluation** and **monitoring** to ensure goals are met.

5. Review Process

Applications are reviewed by Program staff and committees to ensure they are cost-effective, achievable, biologically appropriate and socially desirable. There are three steps to the review process:

1) Stage 1 – Acceptability
2) Stage 2 – Ranking
3) Stage 3 – Project Considerations

1. **STAGE 1 – ACCEPTABILITY**

Any project submitted to the Program must meet the following criteria before receiving further consideration:

- Consistent with Program objectives (as stated above)
- Consistent with BC government/BCH mandates and policies, and with regional fish and wildlife management goals
- Compatible with other resource management objectives
- Based on sound biological principles
- Located within the Program area. This includes most of the Columbia River Basin in Canada, extending from the Valemount area in the north to Grasmere in the southeast and Rossland in the southwest. Note that the Flathead, Kettle and Okanagan river drainages are not included in the Program area at this time.

  If a project is not recommended following Stage 1 review, a letter will be sent to the applicant explaining why.

2. **STAGE 2 – RANKING**

Proposals that meet the Stage 1 acceptability criteria are forwarded to the appropriate technical committee (fish or wildlife) for ranking based on the following criteria:

Contributes to conservation of indigenous species and wild stocks. This criterion is a major priority under the MoELP mandate and follow provincial policy. Secondary importance can be given to augmented or introduced stocks which satisfy angler demand, provided task actions do not impact wild stocks significantly and meet local MoELP management goals.

Protects or augments sensitive or valuable habitats. This criterion provided support for those habitats which serve to protect wild stocks of both sport and nonsport species. It also provides secondary support for introduced or augmented, but valuable, angled and/or harvested stocks and their related habitats.

Improves or maintains local or regional species. diversity. This criterion serves to protect existing biodiversity, but also allows for non-wild stock enhancement in presently barren or depopulated habitats, particularly those which are isolated.

Includes ongoing/existing work requiring continuity. Projects resulting in defensible habitat actions usually require a plan including background and design studies, constructions plans and evaluation studies. This criterion recognizes the importance of this planning approach. It also recognizes that some projects may be staged in their planning and implementation while other must be continuous going from planning to implementation in order to complete the project.

Involves restoration, rehabilitation or enhancement of habitat. Conservation, rehabilitation or enhancement which will protect or augment indigenous biodiversity receives the highest score. Secondary importance is given to habitat work which will contribute to the strength of sport fish stocks, including both wild and introduced species provided these projects meet local management goals.

Addresses a direct impact as a result of dam construction and inundation. This criterion recognizes that addressing water license requirements is a program mandate and an objective of BCHydro. Importance can however be given to off-site tasks (those outside the direct impact zone, but still within the program area), especially where on-site opportunities are restricted. Such support is derived from the basin-wide mandate of the program as dictated by the Steering Committee.

Adequate/logical background and planning has been completed. As task development nears completion within the program, additional support should be provided to assure final construction and/or evaluation. In addition, tasks may come forward for which the necessary background work has been partially or fully completed outside the program. Provided such tasks meet Stage 1 Acceptability Criteria (ie regarding transfer of liability) such tasks should be considered for priority approval.

Addresses an urgent requirement or threat to population maintenance and/or habitat protection. This criterion is included to provide extra support for those species or habitats which are undergoing unforeseen or unresolved dramatic alienation or decline in abundance, respectively. It is directed to both designated endangered species, as well as important sport species.

Cost effectiveness (benefit to cost or risk ratio) and value-added aspects. Higher scores are given to those tasks which show evidence of getting the biggest benefit for the budget provided.

Encourages a coordinated basin-wide approach either in terms of methodology, applicability of study results or the enhancement of habitat productivity. Tasks which only benefit isolated local needs receive less support, while those which benefit wider geographic area or ecosystems within the Program area receive higher scores.

Ease of implementation. Project is easy to implement requiring a low staff commitment or will require significant staff commitment and coordination to implement.

Encourages innovation Project is innovative, incorporating/developing new techniques.

3. **STAGE 3 – PROJECT CONSIDERATIONS**

After the Technical Committees complete the Stage 2 ranking, recommended project applications are reviewed by the Program's Steering Committee (which includes representatives from the BC government and BCH, as well as public representatives). The following considerations are used by the Steering Committee to capture socio-economic and geographic values:

Consistency with the Program Strategic Plan. In order to ensure the Program fulfills its mandate and maintains the direction it sets for itself, projects must be consistent with the strategic plan directions and objectives.

Financial impact of the project on the total Program budget. The Program operates within the limits of a defined annual budget that funds four components of the program, namely fish, wildlife, public comunications and administration. Each project should be reviewed with an eye to how it affects the budget allocation within the individual components and between the components.

Timeline impact on the Program's ability to meet its mandate and/or public expectations. Delivery of projects may span one fiscal year, several fiscal years or be an ongoing requirement to meet project evaluation needs. Commitments to a multi-year or ongoing project need to be reviewed for their impact on the programs ability to deliver other project work in future years, the contribution that project makes towards fulfilling the program mandate and how it may impact public expectations of the program.

Encourage the involvement of First Nations, community based groups and interested individuals. Does the project have direct involvement or potential for direct involvement; volunteer and/or in kind contributions from First Nations; community based groups or interested individuals. The level of direct involvement or in kind contributions and the impact on project delivery and benefit to the resource is considered .

Other partners are involved in the project. While the Program encourages project partnerships, it is important that those partnerships are compatible with the goals of the Program; do not divest agency or industry responsibilities to the program; ensure that the commitment of those partnerships are clearly defined and do not impact on the ability of the program to deliver projects in the future. This is of particular concern where multi-year project partnerships are proposed.

Opportunities provided to raise public awareness of and active support for the Program. Projects can provide varying degrees of opportunities to raise public awareness of both the Program and its partners. Such recognition can be dependent on project location, number and type of partnerships, scope of public exposure, timeliness, local versus international significance, etc.

Geographic distribution of projects throughout the Basin. The program does strive to take a basin wide approach to project allocation and provide a balance of projects throughout the basin. It is recognized that distribution of projects also has to be weighed against priorities and benefits to the resource but it is expected that a wide distribution of projects across the basin will occur over time.

Meeting community and public values. Projects may meet a variety of community and public values in a direct or indirect way. Depending on the type of project, previously identified community priorities, public feedback received and level of community partnership involvement, public values may be taken into account.

Likelihood of the project moving from study to action. Does the initial study proposal indicate "next steps". Have there been previous studies done on the same project and did they lead to action?

A summary of previously approved projects for both fisheries and wildlife is available from any of the Program offices or on the Program website.

6. Important Program Information

Proponents are encouraged to contact the nearest public representative and/or Program biologist to discuss project ideas prior to submitting an application. Refer to the last two pages of this handbook for contact information.

7. The Applicant's Responsibility

In addition to the work that the applicant proposes and agrees to do, there are two other important responsibilities applicants must be aware of and willing to undertake:

- once a project is accepted, adequate accident insurance and WCB coverage must be arranged for all people and activities involved for the duration of the project. This will be arranged in conjunction with the Program.
- to receive project funding, invoices accompanied by supporting documents, such as receipts, must be submitted to the Program office. Note that funds not utilized by the project are retained by the Program.

8. Application Format

The application consists of two parts:

A. ***Project Summary and Budget (see form attached)***. This form is the cover sheet for the more detailed project outline described below.

B. ***Project Outline***. The outline must include the following information. Please use the format and sequence outlined below.

1. ***Project Location***

Indicate the location on a 1:50,000 map and provide a detailed, written description of the location including distances and directions from well-known features such as the nearest town, highway, body of water, etc.

2. ***Project Description and Rationale***

Issue(s): describe why this project is necessary, what need or gap it fills, or what problem it addresses. Describe the urgency/priority of this issue on a regional or provincial scale.

Objective(s): briefly describe the project's objectives, i.e. what is to be accomplished to address the problem/meet the purpose of the project. For example, explain how habitat will be enhanced and for what species, or how information from this project will be used to restore habitat/populations in question. Include a statement on social benefits

Description of work: briefly describe the work to be done, including background information, enhancement activities, research techniques or educational initiatives. Mention any research used to develop the project. Describe the timelines for the project activities.

Measures of success: describe the measurable outcome of each activity, i.e. how the success of the project in meeting its objectives can be measured. E.g., number of hectares slashed, number of km of stream cleaned, production of a brochure. These measures of success will be used to evaluate the overall success of the project.

Proposed future work: if it is anticipated that work on this project will extend beyond the next fiscal year, outline the additional proposed phases including costs for each year. For example, ongoing maintenance costs.

3. ***Public Participation/Partners***

The Program encourages the involvement of the public and the development of partnerships in funded projects. Describe how other partners (e.g., businesses, clubs, the general public, government agencies) are involved in the project and what resources they are contributing.

4. ***Credentials and Letters of Support***

Provide information on the credentials of consulting companies that will be involved in the project. Letters of support may also be submitted, as well as confirmation of other contributors.

Reminder

APPLICATION DEADLINE
AUGUST 1st

Columbia Basin

Fish & Wildlife Compensation Program

103 – 333 Victoria Street, Nelson, British Columbia V1L 4K3

Phone: (250) 352-6874 Fax: (250) 352-6178

LARGE PROJECT APPLICATION

Project Summary and Budget

Project Name _____

(Include a geographic name and a description of the nature of the project. E.g., Frenchman's Ridge Enhancement)

Project Description _____

_____

_____

(Provide a brief summary of project activities)

Project Sponsor (group or individual)

Name _____

Mailing address _____

Town _____

Postal Code _____

Phone _____ Fax _____ E-mail _____

Contact Person (if sponsor is group)

Name _____

Mailing address _____

Town _____

Postal Code _____

Phone _____ Fax _____ E-mail _____

Funding requested from the Program $ _____

Project Budget

Project Name _____

Prepare a budget for the upcoming fiscal year. If the project involves more than one site, complete a budget for each site.

A. Expenditures

Services	No. Days/Hours	Daily/hourly rate	Total
Professional			
Administration			
Technical			
Unskilled			

Total services $ _____

Materials & Supplies

Office expenses. . . . . $ _____

Equipment rental . . . . . $ _____

Vehicle/boat rental. . . . . $ _____

Educational material (signs, brochures, etc.). . . . . $ _____

Total materials & supplies $ _____

A. Total Expenditures $ _____

B. Project Funding (cash)

Other (not Program) cash contributions **confirmed** from:

_____ $ _____

_____ $ _____

_____ $ _____

Total other cash contributions: $ _____

Funding requested from the Program . . . . . $ _____
(Total exper ditures minus total other cash contributions)

B. Total (other + Program) Cash Contributions $ _____

C. Applicant's Contributions (in kind)

Volunteer labour (@min. wage/hour) $ _____

Donated equipment (@prevailing rate/hour) $ _____

Other (specify) _____

_____

C. Total In Kind Contributions $ _____

Total value of project (B + C) $ _____

ALL APPLICANTS MUST READ, SIGN AND DATE THE STATEMENT BELOW:

I/we _____ of _____
hereby make application for financial assistance under the terms and conditions of the CBFWCP in the amount of $_____. I/we acknowledge that the Government of British Columbia and BC Hydro are not liable for any personal injury or destruction of property as a result of this project. All submissions received by the CBFWCP become the property of the CBFWCP.

Project sponsor: _____

Date _____

The completed Application Form must be received at any of the Program offices by **4:30 p.m., August 1**. Applications may be submitted by mail, hand delivery, courier, fax or e-mail.

Small Project Application

Working with the CBFWCP to conserve and enhance fish and wildlife.

First Things First

The Columbia Basin Fish and Wildlife Compensation Program is a partnership of BC Hydro and BC Government created to deliver and coordinate activities that enhance fish and wildlife habitat in the Columbia Basin. Some of these activities are ongoing (e.g., fish spawning channel operations) or research oriented (e.g., a study of lynx habitat and ecology). Other very valuable activities come forward as small project proposals from members of the public.

Where's the Columbia Basin?

To be funded, projects must lie within the Program area, which is most of the area drained by the Columbia River in Canada. It extends from Valemount in the north to Grasmere in the southeast and Rossland in the southwest. The Flathead, Kettle and Okanagan river drainages are not in the Program area.

The Small Project Fund

Each year the Program sets aside money to support small projects (under $10,000 each). Most of this money will be allocated to projects submitted by the public, whether individuals or organizations (such as a rod and gun club or conservation group). While August 1 of each year is the deadline to submit a project application. Projects submitted during the project year will be considered, dependent on available funding.

The fund is designed to support projects such as:
- cleaning debris from a creek
- removing windfall from a deer grazing area
- a deer count in a particular area
- habitat enhancement on a small area

The following types of activities will not be funded:
- construction of boat launches or recreation sites
- debris clean-up on reservoirs
- ongoing administration costs of organizations
- individual compensation for losses resulting from hydroelectric development
- promotion of business opportunities or training

Who Decides on Projects and How?

Project applications are reviewed first by Program staff and then by the Steering Committee, which includes technical and public representatives. The reviews will consider whether the project is:
- **Cost effective**. Compared to the benefits to be achieved, is the cost of the project reasonable?
- **Supported by partners**. Does the project have partners who are contributing resources to the project? Will the applicant contribute volunteer labour, cash or in-kind donations?
- **Achievable**. Is the project do-able, given the time, resources, etc. proposed in the application?
- **Biologically appropriate**. Does the project make sense biologically and is it achieving a positive biological outcome?
- **Socially desirable**. Does the project increase public awareness of fish and wildlife issues?
- **Lawful**. Does the project adhere to legislation and policies? (e.g., the provincial wild fish policy that prohibits introduction of exotic fish into streams with wild fish.)

Help is Available

Individuals or organizations who are considering making an application are encouraged to contact the nearest Program office (in Nelson, Invermere and Revelstoke) to discuss their idea. Staff biologists will assist you to develop your project idea and complete the application.

Applicant's Responsibilities

First of all, your responsibility is to complete the work as outlined in your application. The Program does anticipate a contribution of volunteer labour to projects that it funds. As project sponsor, you must be prepared to coordinate the volunteer labour part of the project.

In addition, you must be willing to:
- ensure adequate accident insurance and WCB coverage is arranged for all participants in the project, through the Program.
- provide invoices, with supporting documents such as receipts, to the Program office to receive the project funding.

Bold and italic text – see Glossary for more information

For Further Information, contact:

HEAD OFFICE, NELSON
CBFWCP
103-333 Victoria Street
Nelson, BC V1L 4K3
Phone: 250-352-6874
Fax: 250-352-6178
E-mail: beth.woodbridge@bchydro.bc.ca

Public representative: Richard Spilker, Castlegar.
Phone 250-365-2183.
E-mail: spilk@direct.ca

EAST KOOTENAY OFFICE
CBFWCP
Box 14, D3
Unit 2 - 108 Industrial Road #2
Athalmer, BC V0A 1A0
Phone: 250-342-3941
Fax: 250-342-3986
E-mail: larry.ingham@bchydro.bc.ca

Public representative: Greg Mustard.
Phone/Fax 250-342-3114.

First Nations representative: Joe Nicholas.
Phone: 250-342-6301.
E-mail: akisqnuk@rockies.net

REVELSTOKE OFFICE
CBFWCP
Box 500
1200 Powerhouse Road
Revelstoke, BC V0E 2S0
Phone: 250-837-2538
Fax: 250-837-9600
E-mail: karen.bray@bchydro.bc.ca

Public representative: Pat Wells, Revelstoke.
Phone 250-837-5792.
E-mail: patwells@rctonline.net

CBFWCP WEBSITE
www.cbfishwildlife.org

Application for Small Project Funding

Project Name _____
(Include a geographic name and a description of the type of activity e.g. Frenchman's Ridge Enhancement)

Project Sponsor (group or individual) Name _____
Mailing address _____
Town _____ Postal Code _____
Phone _____ Fax _____ E-mail _____

Contact Person (if sponsor is group) Name _____
Mailing address _____
Town _____ Postal Code _____
Phone _____ Fax _____ E-mail _____

Project Location and Description

Describe where the project will take place and provide a reference to a well-known feature such as the nearest town, highway, etc. (e.g., Arrow Creek valley, 8 km east of Creston, north of Hwy 3)

_____

_____

Mark the general location on the attached map or provide a more detailed map if available.

Describe the goal(s) of the project.

_____

_____

Describe the activities to be undertaken. _____

_____

_____

_____

Describe the benefits to fish/wildlife and the community of this project. _____

_____

_____

Describe any future maintenance costs or additional project costs that are anticipated for future years.

_____

_____

_____

Project Budget

A. Expenditures

Contracted services _____
(e.g., professional consultant)

Materials & supplies _____
(e.g., flagging tape, notebooks, shovels, postage)

Equipment rental _____

Other (specify) _____

(e.g. mileage) _____

A. Total expenditures $ _____

B. Project Funding (cash)

Other (not Program) cash contributions **confirmed** from:

_____ $ _____

_____ $ _____

Total other cash contributions $ _____

Funding requested from the Program $ _____

(Total expenditures minus total other cash contributions)

B. Total (other + Program) cash contributions $ _____

C. Applicant's Contributions (in kind)

Volunteer labour (@min. wage/hour) $ _____

Donated equipment (@prevailing rate/hour) $ _____

Other (specify) _____

_____

C. Total in kind contributions $ _____

Total value of project (B + C) $ _____

ALL APPLICANTS MUST READ, SIGN AND DATE THE STATEMENT BELOW:

I/we _____ of _____
hereby make application for financial assistance under the terms and conditions of the CBFWCP in the amount of $_____. I/we acknowledge that the Government of British Columbia and BC Hydro are not liable for any personal injury or destruction of property as a result of this project. All submissions received by the CBFWCP become the property of the CBFWCP.

Project sponsor: _____

Date _____

The completed Application Form may submitted by mail, hand delivery, courier, fax or e-mail to any of the Program offices.

CBFWCP Organization, Team Member Profiles & Contact Information

Columbia Basin

FISH & WILDLIFE
Compensation
Program

www.cbfishwildlife.org

Columbia Basin Fish and Wildlife Compensation Program
103-333 Victoria St.
Nelson, B.C.V1L 4K3
Phone: (250) 352-6874
Fax: (250) 352-6178
Email: beth.woodbridge@bchydro.bc.ca
Administration - Beth Woodbridge

NELSON HEAD OFFICE

Public Representative: *Richard Spilker* Ph. (250) 352-2660 spilk@direct.ca
Born and raised in the West Kootenays and nominated by the West Kootenay Outdoorsmen, Richard is an active member in Duck's Unlimited and the Nelson rod & Gun Club. He is familiar with public needs regarding the management of fish and wildlife resources and is a strong advocate for conserving biological diversity and wisely managing habitats. Richard is also a lawyer with the skills to communicate effectively and help facilitate concensus decision-making.

Maureen DeHaan, *Program Manager*
Maureen holds a Bachelor of Science Honours Degree in Environmental Science from Murdoch University in Perth, Australia as well as a Diploma in Forest Technology from the British Columbia Institute of Technology (BCIT). Before joining the Compensation Program in 1994, she was Planning & Assessment Manager with BC Environment and an Environmental Forester with an environmental management firm in interior BC. Maureen is a Registered Professional Biologist and Professional Forester.

Beth Woodbridge, *Administrative Assistant*
Beth joined CBFWCP in 1995 and has 18 years of administration experience with BC Hydro. She applies a broad range of administrative and public interaction experience to what she considers "the perfect job". As the front line person—the first voice you hear when you call the Nelson office—Beth views her role as: "I'm here to help people who are interested in the Program in what ever way I can".

John Krebs, *Senior Wildlife Biologist*
John has extensive experience in both wildlife management and technical forestry, particularly in the Columbia Basin region. A biology graduate from Simon Fraser University, he earned his Masters in Science Zoology from the University of Alberta as well as a Diploma in Fish, Wildlife & Recreation from BCIT. An active member of the Western Forest Carnivore Committee and the North Columbia Mountain Ecological Research Group, John has published over 15 reports on his research work. He has been with compensation programs in the Columbia Basin since 1992. John is a registerd Professional Biologist.

John Gwilliam, *Wildlife Biologist*
A wildlife biologist with compensation programs in the Columbia Basin since 1980, John has a broad range of hands-on wildlife management, habitat enhancement and public involvement experience throughout the area. He was involved in the Pend d'Oreille Wildlife Management Plan as well as developing timber harvesting plans and prescribed burns programs as habitat enhancement techniques. A graduate of the University of Victoria in Biology, John has published a series of reports on his research and programs in the Columbia Basin.

Harald Manson, *Senior Fisheries Biologist*
A graduate of the University of British Columbia with a Bachelor of Science in Zoology, Harald spent 27 years with the Ontario Ministry of Natural Resources before joining CBFWCP. His last position at the Ministry was Operations Supervisor, overseeing the delivery of aquatic research and assessment programs on Lake Erie and Lake St. Clair.

Steve Arndt, *Fisheries Biologist*
Steve has been involved in fisheries-related work in Ontario and New Brunswick since 1982. A Masters of Science graduate from the University of New Brunswick, he is the author of a number of reports on salmonid growth and field assessment. Steve's main interests are fish population dynamics and fisheries management.

John Bell, *Fisheries Technician*
John is a graduate from Lethbridge Community College's Renewable Resource Management Program with a Fisheries Technician diploma. He worked with the Provincial Fisheries Branch in Williams lake, Cranbrook and Prince George prior to relocating to Nelson in the late 1980's

Grant Thorp, *Fisheries Technician*
Grant graduated from Selkirk College in 1980 with a technical diploma in Renewable Resources. He has worked at the Hill Creek Hatchery & Spawning Channel since 1979.

Bob Millar, *Fisheries Technician*
Bob, a graduate from Selkirk College's Fish, Wildlife & Recreation Program in 1990, has been working at Hill Creek Hatchery since 1989.

Ross Clarke, *Contract Wildlife Biologist*
Ross has a broad range of experience in both wildlife enhancement and forestry in British Columbia and Alberta. A graduate of the University of Alberta with a Bachelor of Science in Forestry, he has spent 15 years as a consultant for both government and private industry. Ross has worked with the Compensation Program since 1995. His main interests are in habitat enhancement/restoration and wildlife management.

Ian Parfitt, *Contract GIS Coordinator*
Ian Parfitt graduated from the University of BC with a Bachelor of Landscape Architecture in 1990. He has been using computer-based geographical information systems (GIS) to support ecosystem and species conservation in BC for eight years, the past four years with CBFWCP. Ian has also worked with the Geography department at UBC and the Long Beach Model Forest Program in Uculelet.

Barry Bartlett, *Contract Public Communications Coordinator*
Barry is a photojournalism graduate from Vancouver's Langara College with several years experience in BC community newspapers and 13 years in communications in the energy, manufacturing and forestry sectors prior to joining CBFWCP in 1997. He has received professional recognition for his work including best newsletter in Canada and, as part of a team, best corporate communications program internationally.

EAST KOOTENAY OFFICE

#2, 108 Industrial Rd. #2
Athalmer, BC V0A 1K5
Phone: (250) 342-3941
Fax: (250) 342-3986
Email: larry.ingham@bchydro.bc.ca

Public Representative: ***Greg Mustard***, Windermere
Ph./Fax (250) 342-3114
Jim has been a public representative since CBFWCP's inception in 1995. He was appointed because of his involvement with the Elkford Rod & Gun Club, his understanding of local fish and wildlife issues and his demonstrated ability to bring together different groups to work on a common goal and achieve results. Jim was actively involved in the 1998 acquisition of the 88-ha Musil property for its wildlife values and opportunities for conducting hands-on habitat enhancement activities. He also instructs courses in firearm safety and hunter training.

First Nations Representative: ***Joe Nicholas***, *Windermere*
Ph. (250) 342-6301 (Columbia Lake Band office); (250) 342-6301 (home) E-mail: akisqnuk@rockies.net
Joe was appointed by the Ktunaxa/Kinbasket Tribal council, which includes the Columbia Lake, Lower Kootenay, St. Mary's, Shuswap and Tobacco Plains bands. A chief of the Columbia lake Band for 15 years and currently a band councilor, Nicholas was a member of the Columbia Basin Trust Committee and serves on the Canadian Columbia River Inter Tribal fisheries Commission. Nicholas has had a lifetime interest in wildlife and wants to help address conservation issues resulting from the dams and growing economic development of the region.

Larry Ingham, *Wildlife Biologist*
Larry has been involved in wildlife compensation programs in the Columbia Basin since 1992. As well, he has extensive experience in the region as a wildlife biologist for BC Environment, B. Conservation Foundation and the Kootenay Wildlife Heritage Fund. Larry is a Simon Fraser University graduate in Biology and a BC Institute of Technology graduate of the Fish, Wildlife and Recreation Program. His habitat enhancement proposals have been recognized with two awards of excellence from the Habitat Conservation Trust Fund. Larry is a Registered Professional Biologist.

Bill Westover, *Regional Fisheries Biologist*
Bill has worked as a fisheries biologist for the MWLAP for 27 years and is responsible for fisheries management in the East Kootenays. Bill has a Bachelor of Science in Biology from the University of Victoria and is a Registered Professional Biologist. Much of his work over the last 5 years has focused on bull trout in the upper Kootenay drainage including the Wigwam River and Skookumchuck Creek.

Doug Adama, *Contract Wildlife Biologist*
Doug has worked as a contract biologist for the Compensation Program for 5 years. A lifetime resident of the Columbia Valley, he holds a Bachelor of Science in Biology from the University of Victoria. He has worked extensively on habitat enhancement and grassland ecosystem restoration projects throughout the Columbia Basin.

Dave Lewis, *Contract Wildlife Technician*
Dave, a graduate of Lakeland College's Environmental Science Program with majors in fish and wildlife, worked with the Mica Compensation Program before joining CBFWCP in 1995. A certified trapper and immobilazation/animal handler, Dave works on a range of predator and large mammal projects as well as conducts many of the monitoring and surveying activities relating to Program wildlife projects in the southeast and northern Kootenays.

REVELSTOKE OFFICE

BC Hydro Bldg.
PO Box 500
1200 Powerhouse Rd. Revelstoke, BC V0E 2S0
Ph. (250) 837-2538
Fax (250) 837-9600
Email karen.bray@bchydro.bc.ca

Public Representative: ***Pat Wells***, Revelstoke Ph. (250) 837-5792 E-mail: patwells@rctonline.net
Pat is a 17-year Revelstoke resident with extensive fish and wildlife conservation experience including chair of the Revelstoke Rod & Gun Club Habitat, Access and Land Use Committees; director of the BC Wildlife Federation and BC Conservation Foundation; founder of the North Columbia Resource Council; and a member of the CBFWCP Revelstoke Public Advisory Committee. Pat has also been participating in a variety of conservation projects such as wildlife mortalities on transportaion corridors and grizzly bear management.

Karen Bray, *Fisheries Biologist*
Karen has a Masters of Science in Watershed Ecosystems from Trent University in Ontario and a solid background in the theories, principles and practices of aquatic sciences and habitat rehabilitation. She also has extensive training and experience in methods of assessing and managing habitat, fish populations and environmental impacts. Karen is the author of numerous publications and presentations on aquatic habitat conservation and restoration. Karen is a Registed Professional Biololgist.

NOTES

Return Address:
Columbia Basin Fish & Wildlife
Compensation Program
103 – 333 Victoria Street
Nelson, BC V1L 4K3

BC hydro

PROJECT COORDINATOR/WRITER Barry Bartlett
DESIGN/PRODUCTION Kathy Verigin

BRITISH COLUMBIA